THE
ELECTRICAL REVIEW

Volume CXXIX **No. 3331**

Friday, September 26, 1941

Contents

	Page		Page
Editorial—Electrical Installations	287	Correspondence	303
A Factory Installation	289	Radio Manufacturers	304
I.E.E. Installations Section	294	London Transport Valuation	304
Personal and Social	295	A New Order. By F. B. Dutton	305
Heavy-Duty Cooking	297	Commerce and Industry	307
Selected Station Costs. By R. A. S. Thwaites, M.Inst.C.E., M.I.E.E.	299	Electricity Supply	311
		Financial Section	313
Locating Cable Faults. By G. W. Stubbings, B.Sc., A.M.I.E.E.	301	New Patents	318
		Contract Information	319
Classified Advertisements	69	Index to Advertisers	80

EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: Dorset House, Stamford Street, London, S.E.1

Telegraphic Address: "Ageekay, Sedist, London." Code: A B C. Telephone No.: Waterloo 3333 (35 lines)

Registered at G.P.O. as a Newspaper and Canadian Magazine rate of postage. Entered as Second Class Matter at the New York, U.S.A., Post Office.

Subscription Rates, Postage free: United Kingdom, £1 14s. 8d.; Canada, £1 12s. 6d.; Colonial and Foreign, £1 14s. 8d. per annum.

Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW LTD., and crossed "Lloyds Bank"

R & Co. Ltd.

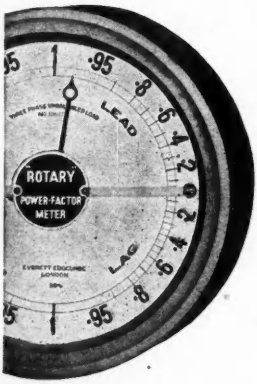
INSULATING BEADS

Resistance Wires

All Ex-Stock

Lionel Robinson
& Co. Ltd.
3 Staple Inn
London, W.C.1
Telephone - - HOLborn 6322

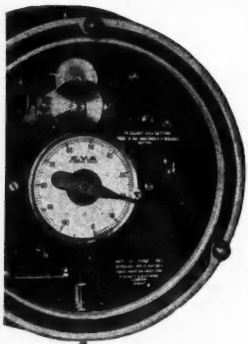
POWER FACTOR METERS



SINGLE & POLYPHASE SWITCHBOARD AND PORTABLE PATTERNS

- The scale extends over the whole circumference of the dial.
- They indicate "Leading" and "Lagging" power factor in both forward and reverse directions.
- No moving coils, ligaments or brushes are used.
- They are independent of ordinary variation of voltage, current and frequency.

MAXIMUM DEMAND "TELL TALE"



TO CONTROL ELECTRICITY TARIFFS BASED ON MAXIMUM DEMAND

- It operates upon the true integrated demand during a given time.
- Accurate time intervals are obtained by a Synclock Synchronous Self-starting Motor.
- It operates a warning lamp or bell, or trip a circuit breaker when the load exceeds a preset value.
- Supplied where tariffs are based on either Kilowatts or Kilovolt-amperes.

PHOTOMETRIC TERMS explained
Write for Leaflet 471

EVERETT EDGCUMBE

Manufacturers of all kinds of indicating and recording electrical instruments and photometry experts

COLINDALE WORKS, LONDON, N.W.9

Phone: Colindale 6045

THE
ELECTRICAL REVIEW
THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXIX. No. 3331. SEPTEMBER 26, 1941 6d. WEEKLY

Electrical Installations

Inauguration of New I.E.E. Section

OFTEN the trite is true, and it is quite justifiable to use the over-worked expression of "meeting a long-felt need" in connection with the formation of the Installations Section of the Institution of Electrical Engineers. Growth of membership has been accompanied by an increasing number of diverging branches of electrical work which the Institution has to cater for and co-ordinate.

It is twenty-two years since the I.E.E. decided that decentralisation was desirable with regard to certain more specialised subjects, because the ordinary meetings could not provide frequent enough opportunities to deal with them as fully as a reasonably large number of members desired. The Wireless Section was then formed and time has shown the move to have been well inspired. This was confirmed by the success of the later Meter & Instrument and Transmission Sections.

For some time there has been a feeling among members that the increasing importance of the lighter equipment used in installations called for fuller treatment than the present arrangements permitted. But for the growing shadow of the war, no doubt this feeling would have been given definite shape before. What brought matters to a head was the need to give all assistance possible, through the I.E.E. Post-War Planning Committee, to the Government in its schemes for reconstruction. In such schemes the electrical equipment of buildings of every kind will play a very prominent part, and the value of active discussion among the I.E.E. membership all over the country has indicated the need for the forum created by the new Section.

The good attendance at the inaugural meeting provided evidence of general support for the setting up of the Section. A thinning of numbers towards the end no doubt indicated that an earlier start than 6 p.m. would have been appreciated, in view of transport difficulties after about 7.30 p.m. in these times. The evening was marred only by the absence through illness of the first chairman, Mr. H. T. Young, whom Mr. J. R. Beard, the President, appropriately referred to as the "father of the Section," since the presidential address delivered by Mr. Young five years ago contained more than the nucleus of the idea on which the Section is based. Mr. Beard also drew attention to the significance of the final "s" in the name of the Section.

The discussion of Mr. R. Grierson's paper, an abstract of which appeared in our last issue, also augured well for the future. While the author gave his subject of floor-heating a topical twist by relating it to surface air-raid shelters the utility of the system that he advocated is by no means limited to the present emergency and the data presented in the paper widens its scope as a reference source.

The Installations Section differs from the others in being more general in its appeal. A large proportion of the membership is concerned in the design of apparatus, in its installation and in devising means by which it may serve the ends of consumers

most efficiently. Moreover, every electrical engineer may be assumed to be a user of his own product and in a position to offer constructive criticism grounded on an appreciation of practical possibilities. The Section will give him the chance to do so.

Valve Makers' Co-operation

MORE radio valves, but a smaller variety, are now available to the public; in fact, last week the British Radio Valve Manufacturers' Association stated that over 90 per cent. of the civilian demand can now be met. The demands of the Services caused a famine for some time but difficulties have been overcome by the grouping of valves of similar characteristics and the pooling of resources where possible. Customers may not be able to obtain valves of particular makes, but they will be supplied with "just as good" equivalents and so they will be ill-advised to "refuse all substitutes."

Phantom Costs

MANY generating stations have been extended beyond recognition since the grid came into being; yet the costs of production, for the purposes of Section 13 of the Act of 1926, have still to be estimated at what they would have been if there had been no grid. As time goes on the fog of hypotheses becomes thicker and thicker, as Mr. D. J. Bolton showed in a recent article. In this issue Mr. R. A. Thwaites discusses further complications that result from the present obsolete procedure. It is high time that methods based on engineering and commercial reality should be substituted for attempts to give to airy nothing a local habitation and a name, and Section 13 should be amended accordingly.

Technical Staffs

As a stabilising force in the electricity supply industry, the Electrical Power Engineers' Association, in association with the National Joint Board, has proved of so much value that its future, as reflected in the question now before its membership of whether to seek affiliation with Trade Union Congress, is of more than private interest. We remember that a similar proposal some years ago was not proceeded with. Many supply men then told us that they regarded their own conditions of employment as bearing little resemblance to those of the manual workers, between whom and the management they were necessarily intermediary, and that the diversity of political views among them made it undesirable that their protective organisation, with its defined objectives, should be connected, even indirectly, with any one political party. While we will not presume to lay down the law in what is primarily a domestic matter, we may hope that members will carefully consider the pros and cons before coming to a decision.

"M" and "k"

ELECTRICAL development has brought with it a tendency to employ symbols that express higher values less cumbrously, *e.g.*, 1,000 MVA or MW, instead of 1,000,000 kVA or kW. It seems unfortunate that the standard prefix symbol for one thousand should be a small letter (which in other instances denotes a decimal part) whereas for the next higher step, one million, it is a capital. International uniformity is important, but clarity is even more so. While KW may be written for kW without risk of misunderstanding, MW means something very different from mW. In transcribing notes a non-technical person tends not illogically to write mW in error. This indicates the need for especial care in checking figures embodying "mega" values.

Supplies During Construction

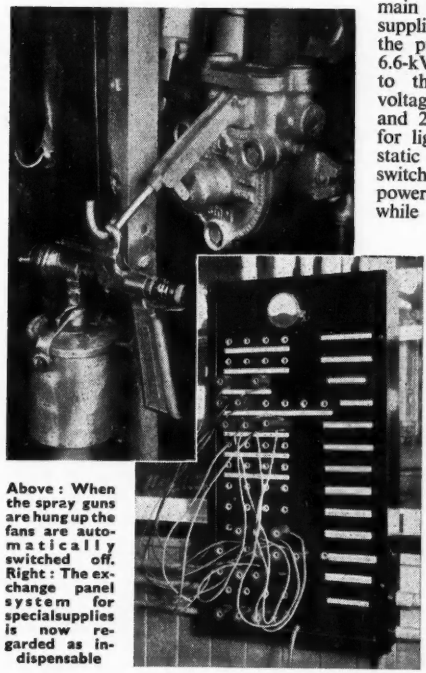
THE suggestion by Mr. F. E. Butcher in our correspondence section for the provision of greater facilities by supply undertakings generally for the establishment of supplies to building schemes in the very early stages, deserves much consideration, both as regards the war effort and the general advancement of the electrical industry. It is sound policy to be "in" with electric supply at the onset because of the psychological bearing on the use of electricity after the completion of building. But apart from this, experience has shown that the temporary supply is itself profitable, and we know of at least two large power companies which for several years have given special facilities for "constructional supplies" with outstanding success. We can see no serious obstacles to the portable substation idea, which is, after all, only a modification of the wider schemes recently advocated in the ELECTRICAL REVIEW for affording local emergency supplies.

A Factory Installation

Electrical Distribution and Uses in an Engineering Works

THERE is always particular interest in seeing how a familiar thing is made, especially to an engineer in regard to equipment he is somehow responsible for, so that the electrical visitor to an electrical equipment factory sometimes does not particularly notice the installation. However, during a recent visit to the new portable electric tool and fractional-horse-power motor factory of Black & Decker, Ltd., we were so impressed by the actual electrical installation that we resolved to devote special attention to this aspect of the works this time.

The factory is a single-storey building of steel-frame construction, with large north lights and wide spans in both directions, and has about three acres of floor space. In general, the layout is in four main sections. At the north end the raw materials, shipping and finished-tool stock sections and the canteen take up about a sixth of the floor space, while at the opposite end the office block occupies a similar area. Between these there are two other sections, each taking about a third of the floor space, namely, the machine shop and stores as one group, and the tool room and assembly and winding departments as the other group. The machine shop is by far the heaviest electrically loaded section of the factory, and there is another load concentration at the west side of the assembly section in consequence of the demands by the tool room and the portable electric tool test department. Two points in the machine shop and one near the tool room have thus been chosen as the main load-centre power distribution points, and there are also two similarly selected main load-centre lighting distribution points.



Above: When the spray guns are hung up the fans are automatically switched off. Right: The exchange panel system for specialsupplies is now regarded as indispensable

At each load centre there is a fuse splitter strapped to one of the building stanchions, which is supplied by a p.i., l.c., s.w.a. floor-duct cable from one of the five 300-A switch-fuses (one for each splitter) in the switch-house in the machine shop section at one side of the factory. The feeder switch-fuses are all served from 400-V, three-phase and neutral busbars in the switch room, where there is also a main 1,000-A oil circuit-breaker which controls the complete installation with the exception of the A.R.P. circuits and certain small auxiliaries, for which there is a separate isolating switch.

The main breaker is fed from the adjacent sub-stations, where a 6.6-kV main and 400-V stand-by supplies are received from the public system and the 6.6-kV supply is transformed to the factory utilisation voltages of 400 for power and 230 (phase to neutral) for lighting. Two 60-kVA static condensers in the switchhouse provide for power factor correction, while a maximum demand alarm relay with two additional over-current relays acts as a "tell-tale" for probable excess maximum demand. The instruments, including a check kWh meter, are mounted on a slate panel above the main circuit-breaker.

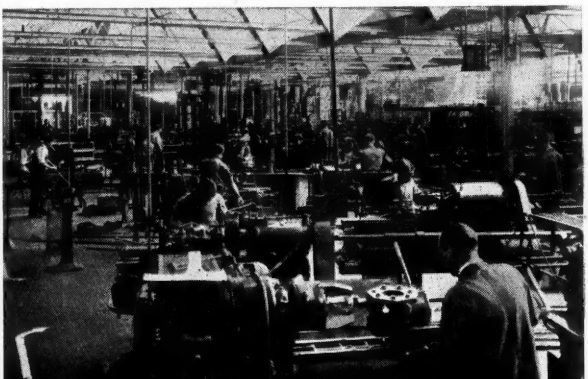
To return to the factory, each of the fuse splitters feeds about six distribution boards via a 100-A isolating switch in each case. These latter equipments are also strapped to the building stanchions, and in the heavily loaded sections almost every stanchion carries a dis-board and an isolating switch. To facilitate supply arrangements for maintenance and special work throughout the factory, there is an abundance of 5-A switch-socket outlets—

one on every stanchion and at 15-ft. spacing along the office walls.

From the splitters all the wiring is v.i.r. cable in screwed conduit cleated to the building girder work. The liberal cable sizing and the complete absence of floor runs in favour of overhead work with vertical "drops" are measures which express the policy of the electrical department of aiming at the maximum flexibility of the installation with regard to both expansion and alteration of the machinery layouts. In this connection a point of particular interest is that whenever a change in the methods of production calls for an alteration in a shop or section layout, the necessary alteration to the wiring is effected on a basis of "complete permanency," the existing wiring actually being dismantled and re-run without resort to any temporary measures or other expedients to effect the alteration.

The individual wartime lighting retains the same illumination at the working level

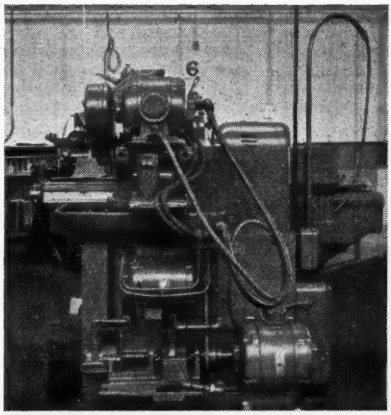
Throughout the factory the production machines are grouped according to their types. For instance, the machine shop is sectionalised for such machine groups as capstans, casting automatics, bar-automatics, drills, millers, grinders and gear cutters. Practically all the machines are individually driven, and a specially interesting point about most of the drives is the scheme for conversion from group driving, as was the case in the company's previous factory from which a number of the machines have been removed. In each case the motor is mounted on an angle-iron frame directly bolted to the machine, and the methods adopted to give the simplest possible transmission in each case are most ingenious. Here the motor and its supporting frame are mounted directly on top of the machine body, and there at the bottom, front, back or end of the machine. In some cases, too, the motor runs in the upright position, in others it is suspended, and there are instances of



Practically all the equipments in the machine shop are individually driven

mounting at varying angles from the horizontal or vertical. Generally there is direct V- or flat-belt transmission to the machine pulley with speed reductions ranging from five to one to about two to one.

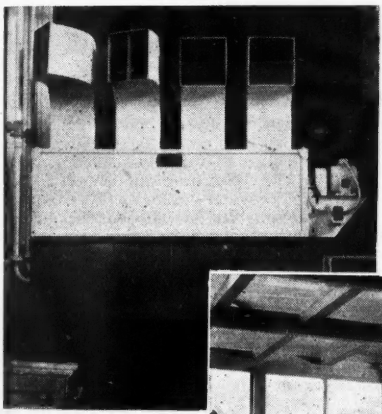
All the motors run at either 1,500, 1,000 or 750 RPM and with the exception of DC motors for speed variation and a few special units, they are all squirrel-cage equipments with direct-on starting by push-button contactor units directly and conveniently mounted on the machines. A scheme of motor size standardisation embraces 2, 3, 4, 5 and 10 HP motors, and here again liberal sizing is a means of ensuring flexibility already referred to, this being rendered possible for efficient running by the power-factor correction scheme.

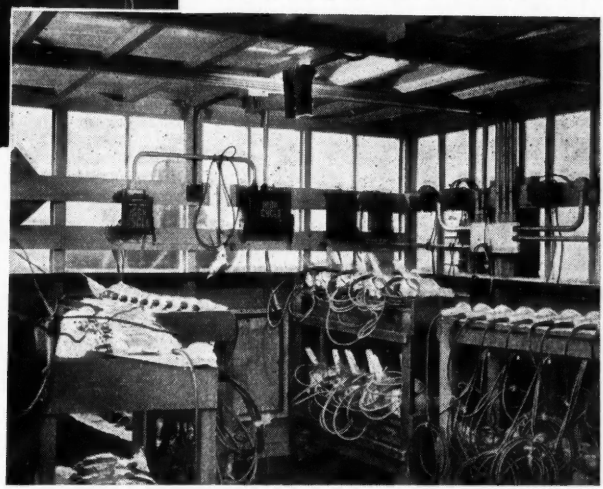


Special machines in the machine shop include an "octopus" equipment with eight drilling arms, each of which carries one of the company's portable electric tools. This machine has been designed for handling a special base casting of peculiar shape which requires drilling at all angles. Another special machine is a universal grinder equipped with three motors and a generator. The top 1½-HP, 1,440-RPM motor serves the grinding wheel with a short V-belt transmission; the second motor (2 HP, 1,440-RPM) at the back of the machine is directly coupled to two pumps, one suds and one hydraulic (oil), while a short V-belt from the shaft serves the 750-W DC generator; and the third or work motor (DC, ¾ HP, 1,800 RPM) is supplied by the generator and its speed is varied by field diversion.

A universal grinder is equipped with three motors and a generator

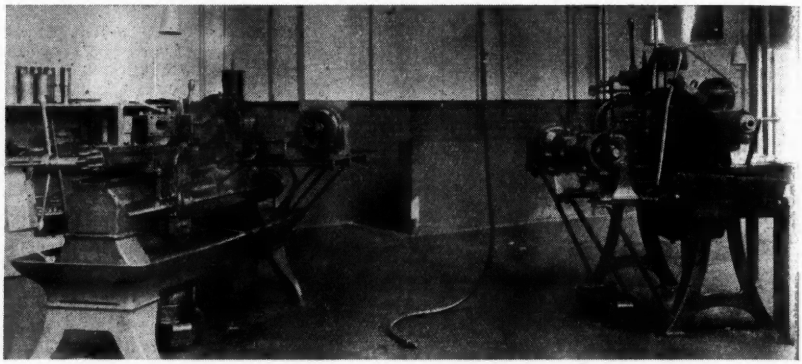
A small room in which portable electric tools are run on endurance tests is deliberately closed in to create a higher atmospheric temperature by means of the running machines.





Above: There are six main hot- and cold-air distributors about the factory. Right: The many switch-plug outlets in the portable electric tool test room are supplied from a special busbar chamber

Various voltages are required for the different portable electric tools and to meet these requirements the many switch-plug outlets around the room are supplied from a special busbar chamber served from a multi-tapping transformer. Six horizontal bars in the chamber are connected to different transformer tappings and constitute single legs of the portable tool supply circuits, while a vertical bar is common to the other tool circuit legs and the second transformer circuit connection.



Methods for the simplest transmission on group to individually driven converted machines are most ingenious

Machine driving arrangements in the tool department follow the general practice of the machine shop, but a feature of the department is a special room equipped with a precision jig borer and an illuminated screen projection outfit for the scrutiny of dies, cams, profiles, etc. A large proportion of the operations in the winding shop is handwork, but there are some motor-driven winding machines, including automatic winders, which are mostly driven by DC motors for speed variation requirements. The necessary DC supply is obtained from a motor-generator set actually installed in the winding shop. It is all bench work in the assembly department, but a feature of the work is the wide use of the company's products—portable electric tools.

Special Supplies Panel

Some of the works departments require various supply conditions for running tests in addition to the usual multi-voltage transformer variations, and to avoid installing special generators in each department, and a large number of wires, a central exchange panel is fitted in the test house from which all special supplies are available. This panel is arranged after the style of a telephone exchange, and to it are connected the various sources of special supply throughout the works and four supply wires to each department, so that by means of wandering leads any supply can be connected to any department.

The special supplies and their sources for the panel are: 400-V, 50 cycles from a disboard near by; 200-V, 50 cycles (and 115-V phase-to-neutral) from a 200-V transformer in the machine shop which supplies a group of machines with multi-speed motors; six values of a voltage range from 0 to 250 from the portable electric tool test room; 125 V and 250 V, 200 cycles from a high-frequency set in the test house; a variable-frequency range from 0 to 250 cycles from another set in the test house; and 110 V–220 V, DC from the motor-generator set in the winding shop. This exchange scheme is now regarded as indispensable by the operating staff and has proved to be a great time saver.

Testing and Service

The test and service departments and the whole of the south side of the factory are wired with the earth-leakage protection scheme described in the ELECTRICAL REVIEW of July 11th. Test buttons and emergency "stop" buttons are lavishly supplied as no wiring is required for them. They are all tested by the electricians once a week in about ten minutes. Each department is divided into groups, and it so happens that in some cases the multi-voltage transformer would be required in any case because of the working voltages required. In one instance the trip is arranged to protect both the primary and secondary of the three-phase transformer by connecting the two neutrals together, but in this case the trip is operated in the no-volt coil of the starter circuit.

In the heat-treatment department there are a 15-kW and a 6-kW resistance hardening furnaces which operate at about 2,000 deg. F., a 2-kW tempering furnace which operates at up to 1,200 deg. F., a gas-fired cyanide bath

with a motor-driven blower, a muffle, a salt bath, a degreaser and an automatic float control system for the cooling water for the cooling tanks, degreaser, etc. Most of this heat-treatment equipment was transferred from the company's old factory where the supply was at 440 V, and, to avoid rewinding, an auto-transformer now supplies the equipment. All the controls are brought out to a central panel and the operating conditions—"on," "off," "hot," "cold," etc.—are indicated by a coloured-lamp system. The tempering furnace has its own pyrometer instruments, but for the two hardening furnaces the controls allow the use of one indicator.

Heating and Ventilation

In a comprehensive heating and ventilation system for the whole works there are six main and six auxiliary hot- and cold-air distributors about the factory, each being equipped with hot-water heater coils, a motor-driven air-circulating fan (1½ HP for the main units and ¼ HP for the auxiliary units), four rising trunks for the air distribution, and a flap-equipped base by means of which cold air can be taken from outside the factory, warm air from inside, or both.

The heaters are served by a water boiler equipped with a 5-HP motor-driven i.d. fan and a stoker and a f.d. fan, together driven by a 4-HP motor. Both of these motors and the dampers are automatically operated from a thermostat on the boiler while a 3-HP motor in the water-circulating system is controlled by a thermostat in the factory proper. To prevent sudden changes of boiler temperature when heavy demands are made an automatic adjustable mixing valve is arranged to re-circulate the water in the factory piping while bleeding only a certain proportion from the boiler.

The paint spray department is separate from the main factory in an annexe with a separate heating unit. With all the exhaust fans running a considerable volume of air passes through the shop and in order to keep its temperature at the required level specially adapted flameproof push-buttons are arranged so that whenever the spray guns are hung up the fans are automatically switched off. This is effected by the suspension hooks being pulled down by the gun to bear on the push-button. The push-buttons are arranged in the motor starter coil circuit and the starters themselves are of standard construction and are situated in a group outside the spray room.

Lighting System

The normal factory lighting system is comprised of 500-W lamps at 16-ft. spacing and 15-ft. mounting height with low-voltage individual lighting where required on the machines.

It was decided that in spite of the black-out requirements full daylight should be allowed in the factory during daylight hours. It was found, however, that the maintenance of good black-out with the bright lighting in the factory was very difficult and expensive, so it was decided to give every worker an individual 60-W or 100-W lamp with an opaque shade, so as to keep the roof or ceiling illumination low while retaining the same illumination at the working level. This has been achieved by means of the "Beeantee" lighting system. The special c.t.s. cable is run along the roof tie-rods and pin-type lampholders are fitted where required to serve vertical drops for the individual lamps over the machines. The system is very neat and flexible and the lighting is excellent. The lighting is controlled by Radiovisors, different settings being used for each part of the factory, and this enables all the lights to be extinguished by one or two switches.

The office lighting is carried out with 5-ft. fluorescent tubes with all the chokes grouped on the factory side of the dividing wall, an arrangement which makes for greater accessibility and neatness. Factory intercommunication is provided by a 50-line dial automatic telephone system, with loud-speaking units in each of the director's offices, and there is a 50-line G.P.O. telephone switchboard for external communications.

We are indebted to Black & Decker, Ltd., for permission to visit the works, and to Mr. F. E. Butcher, chief electrical engineer, for help in collecting the above information.

The Port Washington Station

A SECOND 80,000-kW generating unit is expected to be in operation in 1943 at the Port Washington station of the Wisconsin Electric Power Co. It is considered that advances in design will enable improvements to be made even in the thermal efficiency of the existing plant, which for five years has held the reputation of being the highest in the world. Among other modifications will be the use of hydrogen for cooling for the 22-kV 1,800-RPM alternator.

Performance data given in the *Electrical World* indicate that the net heat consumption of the first unit has decreased from 10,954 BThU in 1936 to 10,729 BThU in 1940, representing thermal efficiencies on kWh sent out of 31.1 and 31.8 per cent. and that 9.83 lb. of pulverised coal with a calorific value of 12,988 BThU per lb. (as received) has been consumed as an average over the five years. The station water rate has been 7.59 lb. per kWh and the steam output of the single 690,000 lb. per hr. boiler has averaged 417,000 lb. to supply a load of 54,295 kW.

The station has been in operation for 87.8 per cent. of this period and has had an availability factor of 89.9 per cent. Approximately three-quarters of the time during which the station was out of commission was due to scheduled inspection and lack of load resulting from excess of hydro-electric energy on the system. Steam conditions at the turbine stop valve are 1,230 lb. per sq. in. and 825 deg. F.

The Installations Section

Inaugural Meeting

AS we mentioned in our last issue, the first meeting of the new Installations Sections of the Institution of Electrical Engineers was held on September 18th. Mr. J. R. Beard (President of the Institution) took the chair, and expressed regret at the absence of Mr. H. T. Young, the first chairman of the Section, through indisposition.

In some opening remarks, the President traced the history of the formation of the three existing Sections of the Institution and spoke of the need for such Sections having regard to the increasing specialisation in various branches of electrical engineering and the opportunities required for full discussions on particular subjects.

Mr. R. Grierson, vice-chairman of the Section, then read his paper on "Space Heating by means of Electrically Warmed Floors as applied to Surface-type Air-raid Shelters" (abstracted in our last issue) and opening the discussion, Dr. P. Dunsheath (Henley's) said that it was not clear from the paper what tremendous progress had been made in the application of electricity to the heating of compartments containing human beings. There seemed to be ideas prevailing among electrical engineers who had not studied the question that the application of heat was the first thing to consider, but the author had emphasised the fact that it was not always the application of heat that was of the greatest importance. Every person was a generator producing potential kW and if he were allowed to get rid of that heat in a correct way he was comfortable, but if that heat was taken away from him in an incorrect manner he was very uncomfortable. This human heat had to be dealt with by the ventilating system.

Comparative Capital Costs

Mr. J. I. Bernard (E.D.A.) said that the particular type of surface shelter dealt with by the author was rather coming into disfavour and the problems arising with regard to trench shelters were rather different. The amount of heat required was much less and it was more a matter of ventilation than of heating. It was not pointed out in the paper whether the capital cost of the floor warming method was higher than was the case with other methods; it might be but it was justified, although that might be a matter of opinion. It was to be regretted that so many civil defence authorities took such a narrow view of the question of capital cost of heating installations in air-raid shelters.

Mr. F. Jackson (L.C.C.) said the paper opened up the whole question of air-raid shelter heating and not merely the use of the floor warming method. In many cases, the heating of such shelters had to be carried out with what most readily came to hand. The electrical industry had been lax in this matter with the result that many small coal burning stoves had been installed and now stood in the way of electric heating. In his own view the radiant electric heater had a great deal to be said for it and, in fact, the balance of advantage lay with it. In most cases it was necessary to heat shelters quickly and there was not time to choose the method too carefully.

Conditions Determine System

Mr. A. J. McColgan (Ministry of Labour, Factory Department) said it seemed to him that the conditions would determine the method of heating to be adopted. He gathered that the shelter dealt with by the author was an empty one but if it had been filled with bunks, probably the bunks in position might have affected the temperature gradients. Perhaps a better method would be to heat the floor but not underneath the bunks and have some form of tubular or other convector type of heating under the bunks. The heat storage system, however, lent itself to off-peak conditions and therefore could take advantage of an off-peak tariff. If one could avoid the fixed charge, perhaps a little more might be spent on the installation.

Mr. S. B. Jackson said that about a year ago he investigated certain aspects of this class of heating and decided to use steel heating cables but could not get permission to obtain them. He then returned to other methods and resolved to use ordinary steel wire and had designed dozens of installations for 14 borough councils. No fewer than 6,000 shelters had been fitted with steel wire in the floors and his own view was that this method was entirely out of the experimental stage. The capital and other charges, on a three-year basis, were something like £2 per shelter per annum less than the author's.

Mr. A. Morgan said that if a radiant heater was switched on in a shelter there was warmth at once in the right place. The L.C.C. had carried out a large number of experiments in the heating of schools and most of their data seemed to disagree with Mr. Grierson in that it was stated that the heating of the floor was definitely uncomfortable.

Mr. A. F. W. Richards asked for more information of the other shelter with which the author was making comparisons, using convector heating. His own view was that the results obtained with this method of heating

compared very favourably with the floor warming method. Could the author give an idea of the energy used under the two conditions?

The author replied to a few of the points raised in the discussion but reserved his detailed reply for the *Journal*. Referring to the remarks of Mr. Jackson (L.C.C.), he expressed the view that the L.C.C. Fire Brigade authorities would have condemned wholesale his method of convection heating. In his view it was thoroughly unsafe. Children could be pushed against the red hot grid and, of course, they could push sticks through the bars.

It had been found that a temperature of 60 deg. F., on the floor underneath the bunks was not uncomfortable. He agreed there was something to be said for heating corridors or down the centres of shelters and not under the bunks, but if convector heaters had to be placed along the walls under the bunks, it seemed to him that the person in the bunk would be rather worse than better off.

PERSONAL and SOCIAL

News of Men and Women of the Industry

WE were sorry to learn at the first meeting of the new Installations Section of the Institution of Electrical Engineers last week that the Chairman, **Mr. H. T. Young,** was not well enough to attend. The President of the I.E.E., Mr. J. R. Beard, who took the chair, said that Mr. Young's illness was due to overwork but he was making good progress in the country. The meeting decided to send him a telegram wishing him a speedy recovery and return.

Mr. G. V. Harrap, technical assistant in the West Ham Electricity Department, has been elected to a committee set up by the Institution of Industrial Administration to direct the activities of its Post-war Planning Group.

Mr. T. H. Carr, who was recently appointed deputy electrical engineer and manager to the Bradford Corporation Electricity Department, has been presented with a grandmother clock by the staff and employees of the Derby Corporation Electricity Department. Before going to Bradford Mr. Carr was power station superintendent at Derby. The presentation was made by Mr. F. H. Pooles, the borough electrical engineer.

Lt.-Col. Sir John Greenly, K.C.M.G., C.B.E., M.A., has been nominated for the presidency of the Institute of Metals for the year 1942–43.

Mr. W. C. Parker, borough electrical engineer, Fulham, has been elected hon. chairman of the Fulham National War Savings Committee.

Mr. J. Marryat, of Marryat & Place, Ltd., who is serving in the R.N.V.R. has recently been promoted lieut.-commander and has been awarded the D.S.C.

The Hammersmith Executive and Civil Defence Committee has decided that to implement the Council's intention to raise the salary of the chief electrical engineer, **Mr. J. R. Jones** to the figure laid down in the National Joint Committee's schedule, i.e., £1,707, the increase will be made in two instalments—£200 as from July 9th, 1941, and a further £107 twelve months hence.

To-morrow's annual meeting of the Women's Engineering Society marks the conclusion of the presidency of **Miss C. Haslett,** who will give an address on "Women in Wartime Engineering." **Miss G. L. Entwistle,** A.M.I.E.E., of Manchester, has been nominated to succeed Miss Haslett.

In reporting the election of **Mr. E. W. Bussey** to the General Council of the T.U.C. (September 12th issue) we described him as president of the E.T.U. He is, of course, general secretary, having recently succeeded Mr. J. Rowan in that position.

We reported in our last issue the marriage of **Miss Margaret Nelson,** daughter of Mr. G. H. Nelson, chairman and managing director of the English Electric Co., Ltd., to **Mr. E. M. Price,**

Mr. and Mrs. E. M. Price

youngest son of Dr. Bernard Price, the well-known South African electrical engineer, We are now able to reproduce a photograph of Mr. and Mrs. Price taken on the occasion.

On September 14th **Sir Montague Hughman** presented silver tankards at an inter-section Guard Mounting Competition held by the two Home Guard platoons identified with Henley's rubber cable works and forming units of a City of London Home Guard battalion. The tankards were provided by Henley's directors. All the 200 members are employees of the company and the unit has been in existence for about twelve months. The judges, Lt.-Col. J. Carey,

commanding officer of the battalion, and Major R. Rainie, M.C., officer commanding "A" Company, warmly complimented the members of the unit for their smart appearance on parade and the able manner in which they carried out the contest.

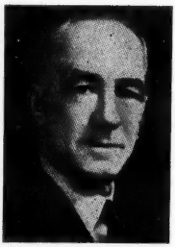
The officers of the Henley unit are Captain R. D. McAvoy, Lieut. A. T. Winder, Lieut. T. J. Wheeler, 2nd Lieut. R. S. Shankland, 2nd Lieut. B. S. Gilronan and 2nd Lieut. G. H. Norris.

After presenting the trophies Sir Montague Hughman paid a tribute to the efficiency and keenness of the unit and also expressed thanks to the adjudicators. He also handed a special silver tankard to Captain R. D. McAvoy in recognition of his work on behalf of the unit. The works manager, Mr. A. McArthur, expressed thanks to Sir Montague.

Dr. J. W. Jenkin, director of research to Tube Investments, Ltd., has been appointed adviser on steel tubes to the Ministry of Supply. He will advise on specifications and methods of production and improve contact between the tube industry and Government Departments.

The changes in the management of the General Electric Co.'s Cardiff Branch resulting from the retirement of **Mr. W. E. Hobbs** at the end of this month, have now been announced. **Mr. H. B. Duce** has been appointed manager and **Mr. J. Williams** assistant manager. Both are already well known in the electrical industry in South Wales. Mr. Duce has been assistant manager at Cardiff since 1926. He joined the G.E.C.

Mr. H. B. Duce



Mr. J. Williams

twenty-two years ago at its head office as welfare and education superintendent, a position for which his earlier experience had made him particularly well qualified.

After leaving Adelaide University he had some experience as schoolmaster in Australia before joining the Australian Imperial Forces early in the last war, and when he left the service was Divisional Education Officer to the A.I.F. In addition to this he has attained considerable distinction as an athlete, particularly in Association football, having gained a Middlesex County Cap as well as an English Amateur Cup medal.

After three years' active service he organised the important welfare and education work undertaken by the G.E.C., and then transferred his attention to the sales side of the organisation, and continued in this department until he was moved to Cardiff in 1926. He is a member of the South Wales Institute of Engineers.

Mr. J. Williams started his career with the G.E.C. at the Cardiff Branch in 1911, and after twelve months he left but rejoined the company again at Newcastle in 1913 where he remained until war was declared in 1914, when he was mobilised in the Territorial Force. During his service overseas he gained the Military Medal, but was wounded and forced to spend two years in hospital. He rejoined the Cardiff branch in 1918 in charge of the Electrical Accessories and Switchgear Departments. During the next twelve years he served successively as assistant manager at the Bristol Branch, as representative of the company in Devon and Cornwall, as manager of the Fittings Department at Cardiff and later the "Osram" Lamp Department there until 1931 when he was appointed manager of the Gloucester Branch.

Mr. A. S. Channon, works superintendent in the Grimsby Corporation Electricity Department is to retire on superannuation at the end of this month.

Mr. A. S. E. Ackermann, consulting engineer, has removed to 9, Rotherwick Road, Hampstead Garden Suburb, London, N.W.11 (telephone: Speedwell 4501).

Mr. J. H. Broome, head of the Telephone Installation Section of Siemens Bros. & Co., Ltd., recently left this country to take up an appointment in Australia. Before he left he was presented with a number of gifts from various departments of the company.

Swansea Corporation Electricity Committee has appointed **Mr. E. F. Wright,** as welfare officer for the Electricity Department at a salary of £250 per annum.

Obituary

Mr. J. P. Anderson.—We report with regret the death on September 6th, of Mr. James P. Anderson, manager of the land installation department of the London office of G. & J. Weir, Ltd., since 1929. Mr. Anderson served his apprenticeship with Alley & McLellan, Ltd., Glasgow, and joined the technical staff of G. & J. Weir, Ltd., at their head office in May, 1913. He served in the army during the 1914-18 war, being demobilised with the rank of captain. Resuming his duties at Weir's he spent some years in the drawing office and estimating departments before his transfer to the London office in 1929. He was associated with the installation of Weir auxiliaries in some of the largest power stations in the country.

Mr. H. K. Harris.—The death occurred at his home at Barnes on September 18th of Mr. Henry Kingsford Harris, M.A., M.I.E.E., F.R.S.A. at the age of 74.

Mr. A. L. Barclay, telephone manager for the Liverpool area, died on September 12th, at Cheadle Hulme, at the age of fifty-eight. He first entered the telephone service in 1898 with the old National Telephone Co. at Aberdeen, after which he went to Edinburgh, and subsequently to Chester as district manager. He was awarded the O.B.E. in the last New Year's Honours.

Mr. William Murray, late manager of Walthamstow Tramways, died on September 16th at his home on Canvey Island at the age of seventy-eight.

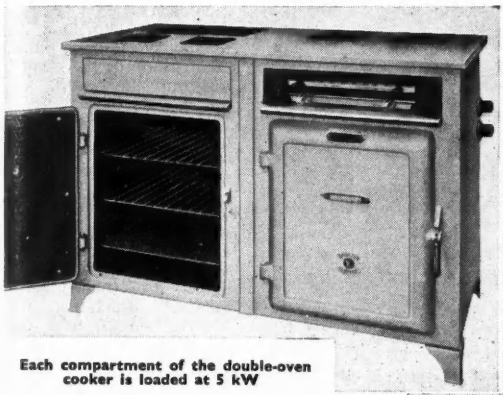
Will.—Mr. William Slack, managing director of the Modern Electric Welding Co., Ltd., left personal estate in Great Britain valued at £13,530.

Heavy-Duty Cooking

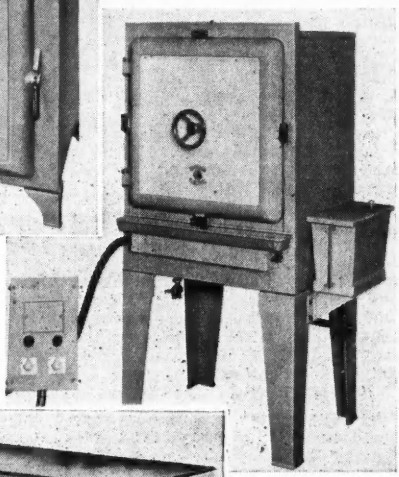
A Complete Range of Equipment

IN order to emphasise the importance of the present trend in heavy-duty cooking, from the points of view of both the war effort and post-war development, we recently published (ELECTRICAL REVIEW, June 13th and 27th) articles dealing with canteen and communal kitchens and the types of heavy-duty cooking equipment available for to-day's special duties. Since then we have received from the English Electric Co., Ltd., details of its comprehensive range of heavy-duty cooking equipment. While we believe that at least some of the items referred to have been in service in canteens for a considerable time this is the first occasion on which the company has made widely known details of the equipment as a whole and on which we have had the opportunity to visualise the productions as a complete range of components for a kitchen installation.

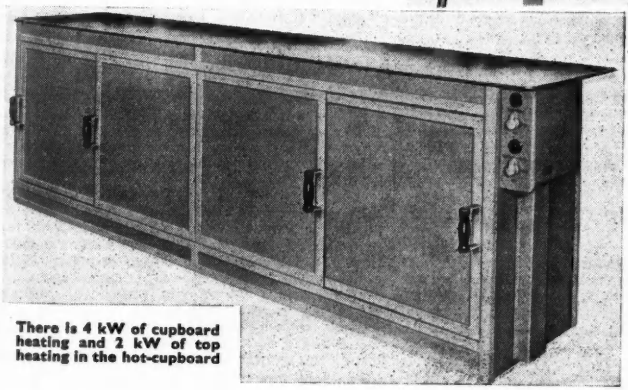
The equipment comprises a cabinet roasting oven, a double-oven cooker, a hot-cupboard, a pastry oven, a single-compartment steaming oven and a single-compartment grill, all of which are selected for detailed reference, as well as such equipments as fish fryers, baking ovens and grills. With one exception, the single-compartment grill, all the selected items have a main finish of grey mottled vitreous enamel. The cabinet roasting oven has just one compartment with a cooking space 24 in. high, 40 in. wide and 24 in.



Each compartment of the double-oven cooker is loaded at 5 kW



8 kW of immersion heaters and a self-feeding ball-valve tank are features of the steaming oven

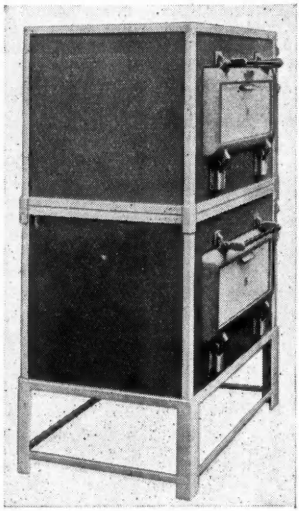


There is 4 kW of cupboard heating and 2 kW of top heating in the hot-cupboard

deep, and a loading of 6 kW. The two doors have white enamel panels, one of which carries a thermometer. The overall dimensions are 49½ in. wide, 44 in. high and 32 in. deep. The general construction is cast-iron framework and sheet-steel filling. A single lever-type handle is a feature of the centre-opening doors. The top switch-box is fitted with three-heat switches, s.p. fuses and pilot lights.

Each of the 5-kW ovens of the double-oven cooker has a cooking space 24 in. high, 20 in. wide and 24 in. deep, while the overall dimensions of the cooker are 40½ in. high, 58 in. wide and 32 in. deep. The ground and polished mild steel plate hob carries a 6.4-kW, 12-in. by 16-in. hotplate, two 3.2-kW, 12-in. by 8-in. hotplates, two 1.6-kW, 8-in. by 6-in. hotplates and a 4-kW grill measuring 18 in. by 12 in. The cooker front, the door frames and the legs are of cast-iron, while the body and the oven interiors are of heavy-gauge sheet steel. The equipment normally has a separate wall-mounting switch-box fitted with three-heat switches, s.p. fuses and pilot lights.

The hot-cupboard is constructed of mild sheet steel and has heavy steel sliding front doors. There are a stainless-steel covering to the top-plate and two sectional perforated shelves inside the cupboard. Synthetic enamel angles and facings are a feature of the finish. The cupboard proper and top-plate loadings are 4 kW and 2 kW, respectively. The internal warming space is 8 ft. by 27 in. by 25 in. high, and the overall dimensions are 8 ft. 6 in. by 30 in. by 33 in. high.



The pastry oven has exposed top elements and bottom elements under the fire-clay floor

The pastry oven is of the double-tier type and measures overall 6 ft. 6 in. high, 3 ft. 7 in. wide (excluding the switch-boxes) and 2 ft. 4 in. deep. Each oven has a cooking space of 36 in. by 24 in. by 9 in. high, and the 4.5 kW of heating elements is disposed partly under the fire-clay floor and partly at the top exposed to the interior. There is double three-heat switch control for each oven which is complete with a ventilator and dial thermometer. The general construction of the outfit is cast-iron framework and braced steel sheeting.

Fitted with 8 kW of immersion heaters, the water container at the bottom of the steaming oven is served by a self-feeding ball-valve tank which maintains constant water level. The elements are controlled by two switches which, with fuses and pilot lights, are carried in a separate switch-box with flexible metallic tube connection. The door has wheel-type handle clamping. Of cast-iron and sheet-steel construction the body measures 62 in. high by 26½ in. deep by 29½ in. wide (excluding the ball-valve tank) while the cooking space is 24 in. by 24 in. by 20 in. wide.

The grill, which has a grilling area of 18 in. by 12 in., is loaded at 4 kW and the overall dimensions are 25½ in. long, 15½ in. deep and 12¼ in. high.

Standard Precision Tools

AT the request of the Institution of Production Engineers and with the co-operation of the manufacturer and in collaboration with the National Physical Laboratory, the British Standards Institution has issued three further specifications for engineers' precision tools. (2s. 3d. each, post free, from the B.S.I. at 28, Victoria Street, London, S.W.1.) These relate primarily to accuracy and performance and not to details of design.

The first, for feeler gauges (BS.957) establishes permissible errors in thickness and parallelism and recommends those series of blades which may be combined together to form the most useful sets.

A second Standard is for precision levels (BS.958) and relates specifically to the type of level used for testing and installing machine tools and for testing the flatness of surface plates and tables. Recommendations are given regarding sensitivities and permissible errors in reading. An appendix to the specification gives useful notes on the choice of a suitable level and on the manner of using it.

The third Standard (BS.959) is for internal micrometers having measuring ranges from 1 to 36 in. and is complementary to BS.870 for external micrometers. It includes recommendations regarding details of design associated with convenience and maintenance of original accuracy, and prescribes permissible errors for various measuring ranges. Appendices include a suggested test for the rigidity of the assembled micrometer and a detailed description of a method of testing the accuracy of readings over its complete range.

Selected Station Costs

Anomalies of Present Statutory Requirements

By
R. Alan S. Thwaites,
M.Inst.C.E., M.I.E.E.,
M.I.Mech.E.

THE framers of the 1926 Bill, which was based on the recommendations of the Weir Committee, embodied a Section (No. 13 in the Act) designed to safeguard selected station owners (called "owners" in this article for the sake of brevity), but for a limited period of five years only.

It was realised from the start that until many of the smaller stations had closed down and/or the general load had increased considerably, the Central Electricity Board might be unable to load up all the selected stations sufficiently to ensure that the addition of its expenses to the station running component would be fully offset by its ultimate share of the fixed charges on the station.

It was felt, however, that after an initial period no safeguard would be either necessary or desirable, but it was strongly argued in Committee that if the total load directed by the Board to be carried by any selected station were no greater or only a little greater than the owner's requirements, then the owner would suffer financial hardship even after five years' operation. On the other hand it was contended in favour of retaining the five years' time limit that, in practice, the Board would of necessity not only load up the selected stations after the initial stage but would extend many of them. The owners would thus have the advantage over all other authorised undertakings of being the only people to own and operate new and/or highly economical plant with consequent low generating costs, so that in equity the stipulation should end after five years. The debate on this point was long and comprehensive and in the end the time limit was deleted.

Some way out of the ever-growing difficulties in connection with the application of Section 13 of the 1926 Act will have to be sought, but the author considers that it must be something more complex than a simple stepped tariff for all supplies from the Board

One object in providing the grid has been to enable the proportion of spare plant in the country to be reduced considerably and this has been accomplished. Since independent operation costs must include the charges on adequate spare plant, it follows that hypothetical sets must come into the picture. Mr. Bolton has already described * how year by year the calculations become more and more involved, particularly under war conditions when even hypothetical A.R.P. works come into view.

War conditions have, moreover, imparted a further element of unreality and possibly inequity to Section 13, because the interconnection provided by the grid not only gives greater security against temporary interruption than independent operation, but also provides a degree of insurance against *direct* war damage to stations which would, in the absence of the grid, not be available. To make that insurance effective, however, it is necessary to keep a great deal of plant on load at stations which, from the point of view of pure economy, would have been closed down at off-peak periods, and the strict application of Section 13 makes no provision for meeting this extra cost.

Mr. Bolton suggests a straight two-part stepped tariff for all supplies from the Board and this would postulate the repeal of both Sections 7 and 13. At first sight this would appear to be a simple and attractive solution. The grid was intended to secure economy in generation as a whole, and this having been accomplished it should logically be possible to design a tariff which would on the average be no greater than the independent operation costs of all the selected stations added together. The steps in the tariff would take into account the higher independent operation cost at small stations. I advocated such a stepped tariff when the first grid tariff, *viz.*, that for Central Scotland, was in draft form. The Board had a special problem to contend with, however, in connection with the tariff because Section 14 precludes it from closing down a non-selected generating station unless it can provide a supply either directly or indirectly at a price less than the cost of actual local generation *exclusive of capital charges on the generating station.*

As the essence of the whole scheme was to close down as many as possible of the non-selected stations, it followed that the grid price for supplies of up to, say, 5,000 kW or so had to be less than the full independent operation cost for a similar station, seeing that such cost includes capital charges. The introduction of the "basic-demand" system was designed to meet this condition, but did not prove entirely effective in doing so. As a result, another method of dealing with the situation was

* "Hypothetical Justice," ELECTRICAL REVIEW, August 1st.

developed and formed the subject of an amending Act in 1935.

The idea of a straight stepped tariff for all supplies from the Board falls down, however, because the independent operation cost at selected stations of similar capacity varies considerably as between one and another, even in the same grid area. Any common average tariff, if fixed at the level necessary to meet the total cost of production plus the cost of running the grid, must of necessity be based upon the average cost of production; this represents a cost which is higher than the independent operation cost of some owners and less than that of others. Those whose independent operation cost is below the average would have a great deal to say on the subject, much of which might be justified having regard to their power contracts.

Had the time limit under Section 13 been retained, owners would have had at least ten years in which to adjust their power contracts, *viz.*, the period during which the grid was being constructed, plus five years, but to repeal Section 13 now would undoubtedly result in many cases of hardship unless provision were made for the lapse of a number of years before it became effective.

At the present time, therefore, it seems difficult to substantiate the claim that a stepped tariff for all supplies from the Board, however simple and attractive it might be to the Board, would approach equity. Some way out of the ever-growing difficulties in connection with the application of Section 13 will have to be sought, but whatever the best solution (and doubtless the Board has given much thought to this) it would seem that it must of necessity be something more complex than a tariff of this kind.

As a postcript, I would raise a final point, *viz.*, that large munition works, and particularly electro-chemical works, can be, and are being, erected in from six to twelve months, while the extension of a selected station under present conditions takes at least two years. Where large concentrations of such munition works are being put down owners are often affording supplies greatly in excess of the capacity of their stations. The existence of the grid is therefore enabling them to do something which they could not possibly do under independent operation and the country as a whole is thus obtaining an enormous added benefit from the grid during the present emergency.

Recent Researches

A COMMUNICATION from the Paint Research Station has been issued by the British Electrical and Allied Industries Research Association, 15, Savoy Street, London, W.C.2 (Ref. A/T77, 15s. 4d. post free) describing an investigation into the effect of "cutting oil" on air-drying varnish and chlorinated-rubber paint after various conditions of storage. A rotating point penetrometer was used to determine the hardness of films of the varnish and paint, after they had been subjected to one "cutting oil," the criterion being the maximum load applied to the ball-point of the penetrometer when penetration of the film occurs. The paint withstood the action of the "cutting oil" much better than the varnish under storage conditions.

A second investigation was carried out with three types of cutting oil on various kinds of varnish (air-dried and stoved) and a chlorinated-rubber paint in which a scratch-hardness tester was used. "Finger-nail tests" were also made.

The criterion of hardness was the maximum load applied to a ball point (1 mm.) that would just scratch through the film of varnish or paint when drawn under the point. The order of merit of the varnishes and paint was substantially the same for the three types of cutting oil, and general correlation was obtained between the results of the scratch-hardness and "finger-nail" tests.

Mechanical Behaviour of Bitumen

The principal object of a recent investigation undertaken by Mr. W. Lethersich on behalf of E.R.A. was to develop a method of test whereby the liability of bitumen to crack when subjected to large stresses might be determined.

It is shown that the mechanical behaviour of bitumen can be completely expressed in terms of an equivalent mechanical (or electrical) circuit comprising elements corresponding to four fundamental physical constants, namely two viscosities and two elasticities. Knowledge of these constants enables the reaction of a given material to be predicted for different kinds of stress, and the regions of plasticity and brittleness to be determined. Improved methods of test are suggested for industrial use.

Copies of the report, Ref. A/T83, "Mechanical Behaviour of Bitumen," may be obtained from the Association at 15s. 4d. post free.

Synthetic-Resin Bonded Fabric Sheet

Hitherto the only British Standard Specification relating to synthetic-resin bonded fabric sheet has been B.S.668, which covers materials for gears. A new war emergency Specification, "Synthetic-Resin Bonded Fabric Sheet for Electrical and Mechanical Purposes" (B.S.972, 2s. 3d., post free) has now been issued to provide for types suitable for electrical purposes.

The Specification, which deals with three types of bonded fabric sheet between $\frac{1}{16}$ and 4 in. thick, is divided into three parts containing general clauses, mandatory clauses and optional clauses for application when it is indicated that the material is for electrical purposes.

The new Standard is based on data in the possession of manufacturers and users represented on a special committee. It is hoped that a full investigation will in due course be made by the Electrical Research Association (which has previously provided data for the majority of the B.S. Specifications for insulating material) with a view to the revision of the Specification.

Locating Cable Faults

Methods Available in the Absence of a Sound Core

By
G. W. Stubbings,
B.Sc., A.M.I.E.E.

A DIFFICULT problem which often confronts the distribution maintenance engineer is that of the localisation of a fault on a multi-core cable in which all cores are earthed and short-circuited. Unless a sound conductor traversing the whole length of the faulty cable can be obtained all the usual methods of localisation fail. There are two possible methods of locating a fault of this kind which are not described in many reference handbooks and which are of practical interest to the mains engineer. One of these is a modified fall of potential test and the other is a bridge method often called the overlap or the Warren method.

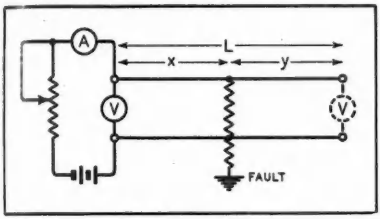


Fig. 1

The fall of potential method is simple in theory. Current, held at a steady value as indicated by the ammeter A in fig. 1, is passed from a battery into the circuit formed by two cable cores and the short-circuit fault from one end of the cable, the two cores being isolated at the other end. The voltages between the two cores are measured at both ends of the cable. On the assumption that the fault resistance is constant, the difference between the voltmeter readings will be equal to the fall of potential in the cable cores from the point at which current enters to the fault. The battery and ammeter are then transferred to the other end of the cable, and the fall of potential in the cable from this position to the fault is similarly determined as the difference of two voltmeter readings. If the two falls of potential so determined are respectively V_1 and V_2 then, as these are proportional to cable lengths, the distance of the fault from the first position will be given by the formula $x = L \times \frac{V_1}{V_1 + V_2}$ where L is the length of the cable.

Accuracy depends upon constancy of the testing current and also upon constancy of the fault resistance. The quantities V_1 and V_2 are the differences of pairs of instrument readings, and the higher the fault resistance the smaller will be these differences relative to the reading, and the greater will be the effect of instrument errors. The best results are, therefore, likely to be obtained with this test when the fault resistance is very low.

The overlap method of locating short-circuit and earth faults is a modified bridge method and is applicable when the two cable cores forming the loop are of equal cross-sectional area. A slide wire bridge S, in fig. 2, is connected to the two equal-section cores, a third core, also faulty, being used as

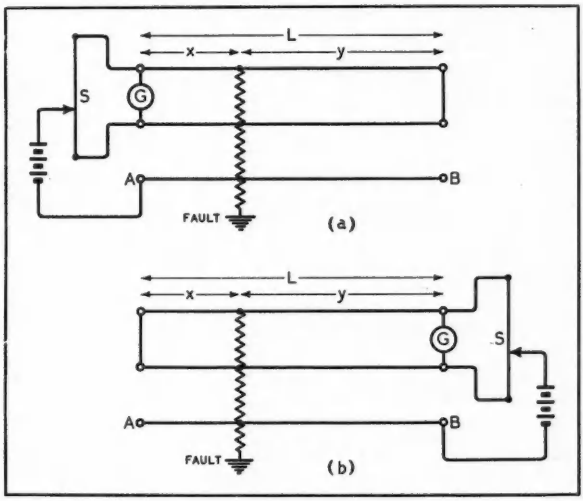


Fig. 2

the return for the current passed into the loop. With a complete earth and short-circuit fault, both cores of the loop are connected through the fault resistance to the return core, and the loop cores are also connected together by the short-circuit.

The effect of these connections is to give a false position for the fault when this position is calculated by the ordinary rules, and the theory of the overlap test is based upon the assumption that the virtual fault position when testing from either end of the loop is equal to the actual distance from this position plus a constant fraction of the remaining length of the loop. Thus, if the fault position is distant x from the A end and y from the B end, $x + y$ being equal to L the length of the cable, balance of the bridge circuit will be obtained with readings a and b of the sliding contact that correspond to fictitious fault positions distant respectively from A and B by $x + ky$ and $y + kx$.

The grounds for this assumption are not self-evident, but as the assumption forms the basis of the theory of the test, we state it without comment.

Overlap Test Formula

To make the overlap test, the bridge balance is obtained from each end of the faulty cable in turn, the cable loop in each partial test being completed by a low-resistance connection in the usual way. The overlap method is peculiar in that, provided the fundamental condition—that of equal cross-sections of the two cables of the loop—is satisfied, the formula is correct when the ends of the slide wire are not electrically identical with the ends of the loop, but are joined to them by connecting leads of exactly equal resistance.

We shall therefore establish the formula for the testing condition in which a slide wire of S length units is joined to the loop by connecting leads, each of which has a resistance equal to n length units of slide wire. When the balance test is made at the A end, and a slide wire reading of a is obtained, the fictitious distance $x + ky$ of the fault is given by the expression $2L\ (a + n)/(S + 2n)$, because the total length of the loop is equal to 2L, the total length of the two slide wire arms of the bridge is $S + 2n$, and the virtual distance of the sliding contact from the end of the cable loop is $a + n$.

The following equation can therefore be written down: $2L\ (a + n) = x\ (S + 2n) + ky\ (S + 2n)$. Similarly, if b is the reading of the position of the sliding contact when the test is made from the B end of the cable, we can write $2L\ (b + n) = y\ (S + 2n) + kx\ (S + 2n)$, and k can be eliminated from these two equations by multiplying the first by x, the second by y and subtracting. This gives $2Ln\ (x - y) + 2L\ (ax - by) = (x^2 - y^2)\ (S + 2n)$. Dividing both sides of this equation by $x - y$, recollecting that $L = x + y$, and removing this common factor, we find that the first term on the left-hand side is cancelled by an equal term on the other side and that we are left with $\frac{ax - by}{x - y} = \frac{1}{2}S$, whence, substituting $y = L - x$, we obtain $x\ (a + b) - Lb = Sx - \frac{1}{2}SL$, whence $x = L \times \frac{\frac{1}{2}S - b}{S - (a + b)}$ and, similarly, $y = L \times \frac{\frac{1}{2}S - a}{S - (a + b)}$.

The fundamental assumption underlying the theory of this test is that of the effect of the fault resistances on the fictitious fault position. As this effect will be smaller the greater these fault resistances, we may conclude that the possibility of error from this assumption will be less as the fault resistances increase, provided, of course, that sufficient current can be passed from the loop into the return cable for testing purposes.

It may be noted that as the final formulas for calculating fault position contain neither k nor n, this formula is true if either of these quantities are zero. The formulas are, therefore, applicable for the localisation of ordinary earth faults, with a sound conductor for the loop, when the slide wire is joined to the ends of the loop by connecting leads of equal resistance, provided the cables of the loop are of the same cross-sectional area. We may note that when n and k are each zero, then, with similar cables forming the loop, $a + b = \frac{1}{2}S$, and the above expressions for x and y are reduced to the usual forms $x = L \times \frac{a}{a + b}$ and $y = L \times \frac{b}{a + b}$.

Peat and Water-Power

WRITING in a recent issue of the *Irish Builder and Engineer*, Mr. Desmond McAteer recalls a plan in 1924 for a Liffey hydro-electric and peat power scheme, for which he was consulting engineer. This comprised two economic hydro-electric stations, without a large expenditure on water storage, and a peat station as standby. Advocating the use of peat and water as partners, he points to the fact that the Pigeon House (coal) plant has been increased to something like 100,000 kW to act as standby to the Limerick hydro-electric scheme, and says it would have been advantageous to have had the station consuming peat, which is the natural standby fuel for water, because in years of heavy rainfall it is scarce, while in dry periods it is abundant. In the original scheme the peat was to be carbonised, the by-products recovered and the clean gas issuing from the scrubbers and condensers used as free fuel under the boilers. It was calculated that in this way the cost of power from the peat station under the conditions of combination with the hydro-electric plant would be less than that of power from the hydro-electric stations. It would be a mistake, he says, merely to destroy peat in boilers for the sake of the heat energy only. At the Italian Torre Del Lago station (15,000 kW) the by-products include 4,500 tons of ammonium sulphate and a similar quantity of tar.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions

Supplies to Building Sites

COMPLAINTS from friends in the building industry, and subsequent investigation, have revealed that on the average building job it is rare for electric power supply to be available at the outset, and in very many cases it is the last service to be laid on, and then often has to await the signing of the occupier's agreement before a supply is actually on tap. Usually the first services on a building scheme are the telephone and water, and then come the petrol-driven appliances. Why should not the concrete mixers, cranes, hoists, compressors, crushers, pumps and portable tools be electrically driven?

I suggest that every supply undertaking should have at least one portable substation, from which a temporary supply could be given in the early stages of a building scheme. It should be a sort of miniature hut with a hinged side and should contain an isolating switch and circuit-breaker, metering panel, transformer, distribution board, a board with a number of socket outlets, and small drums with various lengths of trailing cables. A good type of clamped plug should be used. Poles could be used, if desired, to support the cables, or it might be found better to bury t.r.s. armoured cables in shallow trenches.

I suggest the transformer because, with the earth leakage protection scheme described in the ELECTRICAL REVIEW of July 11th, 1941, it would give the best possible protection against shock. With the larger machines mentioned, there would be probably enough contact area with the ground to operate the trip, even if the earth continuity conductor were broken. Also, the mass of metal of the machine need not be insulated from earth. With such a scheme in being, sites could be visited and assistance given by the consumers' engineer, and the portable substation could be connected to the nearest convenient overhead line or underground distribution point.

The supply agreements should be as simple as possible and under these conditions the undertakings would stand to lose far less than the builders' merchant who deposits material on site. One supply company has, I believe, made endeavours along these lines, but much as these efforts are to be praised, they still fall short of requirements or possibilities.

Let the supply companies get to work; all the materials are available and they owe it as a duty to the nation during the present emergency, and to the electrical industry as a whole for the eventual peace-time building rush.

Slough. F. E. BUTCHER.

Reading Matter for the Blind

THE correspondence on this subject makes it clear that the requirements of blind people for books are not fulfilled by the present methods. Braille books are too big and costly and no ordinary room could house a reasonable library of them, nor could most people afford to buy them. It may be doubted whether the other appliances, ingenious as they are, meet the requirements, and one would like some statistics as to the number in use.

I suggest the following means for making Morse code books cheaply. Instead of a typesetting machine the operator would use a lantern with which he would flash Morse signs on to a cinema film as it travelled past the lens. The Morse dots and dashes would be very small so that a large quantity of matter could be printed on a film. They would be magnified by a lens when being scanned so that the small marks would serve as if they were large.

After being photographed on the negative they would be printed on a long ribbon of photographic paper. There would be several rows which would run alternately forwards and backwards so that at the end of the roll it would only be necessary to reverse it and run it on to the other spool, as is done with a typewriter ribbon. The spools would be of reasonable size, a foot diameter serving for a lot of matter.

In use the ribbon would run past a photo-electric cell which would transform the dots and dashes into sound on a headphone, the power required for this being microscopic. The spools would be run by clockwork as in a gramophone. This method avoids the use of special typesetting or printing machines, and any person could set it up who knew the Morse code, which is simple enough for boy scouts and girl guides to learn.

When one considers what blind people miss, especially grown men who have been blinded in war, it is up to us to do something to render their lives more endurable.

Tynemouth. C. TURNBULL, M.I.E.E.

Active Service

WHEREAS the membership lists of the Institutions of Civil and Mechanical Engineers denote by means of symbolic prefix the names of those who have seen active service, that of the I.E.E. gives no such distinction.

I have often heard it asked why procedure should so obviously differ in this respect, and the present would seem to be an appropriate time to inquire "Why?"

Uxbridge. PUZZLED.

Radio Manufacturers

Minister's Tribute and Appeal

LORD HIRST, the President, took the chair at a luncheon organised by the Radio Manufacturers' Association at the Savoy Hotel, London, last week. The guest of honour was Lord Hankey, the Paymaster-General, who made a speech in which he expressed the Government's appreciation of the part played by radio scientists and manufacturers in the prosecution of the war.

He believed that in this direction Great Britain led the world, but the time had not yet come to tell the tale. One example was the development of "radiolocation" upon which a beginning was made as early as 1935.

When the war broke out the industry was occupied with its great exhibition at Olympia, and it had been called upon to change from domestic radio to a huge programme of war production almost overnight. The difficulties were colossal but they had been overcome by the industry's zeal and enthusiasm.

Apart from having to produce equipment, however, the industry had been called upon to provide skilled men for its operation, maintenance and repair. To avoid straining the industry too far it had been necessary to supplement the personnel by training men and women for the work. Courses had been established in technical colleges by the co-operation of the three Services, the Ministry of Labour, the Board of Education and the Radio Manufacturers' Association. In this connection he made special reference to the work of Mr. E. Rosen and Mr. R. P. Browne, the secretary of the R.M.A.

Although great progress had been made the supply of personnel of the right standard did not yet equal the full demand. He therefore appealed to radio manufacturers to release every radio technician who was under the reserved age they possibly could. Lord Hankey mentioned that in order to enable young people of both sexes to proceed to universities to be trained as officers for the forces and for research work a scheme of State bursaries had been instituted.

He went on to say that one urgent need raised by these training schemes was for equipment of the type normally used by manufacturers and retailers in their service departments. He therefore appealed to the industry to sell or present any instruments of these types through the Association.

Equipment Required

Lord Hankey's appeal has been supplemented by a notice issued by the R.M.A. which suggests that radio dealers who have instruments which they can dispense with should get into touch with the Secretary of the Association at 59, Russell Square, London, W.C.1. Only instruments in perfect working condition should be offered and they should be of the following types:—"Avometer" Models 7 and 40, and "Avominor." The type, age and price desired (if a sale is contemplated) should be stated.

We understand that the Radio Manufacturers' Association will make every endeavour to replace instruments so offered at the earliest possible date.

London Transport Valuation

JUDGMENT was delivered last week in the appeals of the London Passenger Transport Board and the London County Council against the valuation for rating purposes of the Board's properties. The Railway Assessment Authority had determined the Board's average net annual receipts for the period in question, July 1st, 1933, to June 31st, 1935, at £3,108,004. The Transport Board contended that the amount should have been not more than £2,672,346, and that the net annual value of the transport undertaking was not £1,594,000 as computed by the Assessment Authority but not more than £400,000.

On the other hand, the London County Council maintained that the correct assessment was £2,085,000. The Authority had not taken into account £273,156, the average of two sums paid to the Board under the Development (Loans, Guarantees and Grants) Act, 1929, and Section 45 of the Board's Act of 1933.

In reading the judgment, Mr. Justice Wrottesley said that the £273,156 had been properly excluded from the assessment but a sum of £20,000 received in respect of licences dealing with bookstalls and similar premises should have been included, raising the total annual receipts to £2,692,346. A sum of £415,000 claimed by the Board for renewals was a proper provision.

After considering the position with regard to such items as rolling stock, locomotives, tramcars and trolley vehicles, signalling apparatus, machinery and plant in the Board's workshops, etc., the Court held that a rent representing a fair and just division of the receipts between landlord and tenant was £945,270 which would therefore be the net annual value for rating purposes.

His Lordship, in conclusion, deplored the fact that twenty-two days had been devoted to the appeals, stating that this would have been a liberal allowance in peace-time but might be thought extravagant "with the enemy at the gate."

The question of costs was deferred for consideration and the Court directed the Railway Assessment Authority to work out the figures on the basis of the judgment, which came into effect immediately.

A New Order

Closer Working in the Supply Industry

By Francis B. Dutton

IT is good to see in some quarters of the electricity supply industry signs of a desire to improve our scheme of things. The time is certainly opportune, because we know that we are now at a period in our history when a transition is possible. Evils have arisen during the past twenty years or so that have features of those which affected industry during the worst periods of the 19th century. We have seen excessive individualism undercutting prices and carrying out shoddy work, encouraged by speculative builders who judged an electrical installation solely by its price.

For want of proper regulation it has been possible for all sorts and conditions of men to set themselves up as electrical contractors. Wireless retailers, spare-time amateurs and shop assistants have undertaken work that is connected up to the supply because no one has had the authority to prevent it. Faced with excessive competition of this nature the bona fide contractor has not been able to carry out progressive development work.

The author maintains that the war has afforded an opportunity for clearing up the dissensions between contractors and supply authorities. He visualises a co-ordination of all activities of the industry

Other well-known examples of evils affecting our industry could be quoted, but it is more to the present purpose to realise that we have erred in the past for the want of proper organisation, and that now is the time to act and lay the foundation of our "new order."

This phrase has been tossed about the world lately like a shuttlecock, but it has not thereby lost any of its significance. Millions of people who formerly connected it with "Orders is Orders," now see it in its true light. One of the world's greatest philosophers has defined order as a unity arising from the proper arrangement of different objects. Hence we should strive to form that proper arrangement within our industry which will enable us to fulfil our purpose in the social and economic life of our country.

We have often been told that man is a social being and needs the aid of his fellow men to make good his deficiencies. Most of the evils affecting modern society arise from ignoring this fundamental principle. It seems tragic to realise that it takes a war to make us understand that we must co-operate with our neighbours.

Association naturally arises among those whose interests are similar or among those engaged in similar occupations. We have already seen the formation of many associations which, in their several ways, represent and regulate the interests of particular groups. No one can say that there has been bitter dissension between these various groups, but certainly most of them were formed for protective reasons.

Here, then, is our beginning, the recognition and acceptance of the interdependence of all associations. All are necessary to each other. The formation of a true organism to carry out the work of supplying the needs of the community with electricity depends on the co-operation of the two main parts of the supply industry, all those who make up the group under the heading of electrical contractors and all connected with electricity supply (generation and distribution).

In the past we have seen a form of class struggle between these two bodies where there should have been wholehearted collaboration. Supply authorities have dominated the field of development, taking advantage often of the heavy spade-work done by the electrical contractors. This may have been the cause of the apathy we have seen among the contractors. Where there should have been unity there has been enmity. The essence of a new group will be that every interest is represented, employers, both contractors and supply authorities, and employees of all grades, technical and clerical, supplemented and strengthened by representatives of the great professional bodies.

We have the beginning already made in the existence of many associations, but it depends on the united effort of all to consolidate the whole. There is an outstanding need for greater economic efficiency which would be obtained by vocational grouping. The small man's business should not collapse in time of national crisis and in time of prosperity he should have that share of the work which is his livelihood, and not at any time be undercut by excessive competition. It has been proved again and again that co-operative development work is successful. The consumer's needs are satisfied, the contractor does the job, and the supply authority sells the "juice." One feels

that perhaps the consumer has a function and a place in an electricity supply group.

Those of us in the electricity supply industry, whether we are engaged in generation, distribution, or equipping premises to use electricity, have a duty to the community in working for the common good, which for us lies in arranging that everyone can enjoy these benefits. This is our great moment to play our part in the work of social reconstruction. We must visualise a well-regulated co-ordination of all activities within our industry in which all will be charged with a duty to promote the common welfare and the general interest of the profession.

The common purpose would be secured through district, regional and national councils having authority to enact laws binding all members of the organisation, and able to represent them before higher authority when protection is needed. By this means we can secure for ourselves a social and economic organism that will be our contribution to the future tranquillity of our national life.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Announcer's Microphone

A CONTROL box type of moving-coil microphone designed for message announcing systems is made by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. Since the coil is of low impedance (15 ohms) a relatively long connecting line may be used between the instrument and amplifier without deleterious effects on the frequency response and noise pick-up. Sensitivity is described as 65 db below one volt RMS at 1,000 cycles. When remote switching is required to control the amplifier, or distant selection of speech lines, a switch box can be supplied with the microphone embodying additional control keys and signalling lamps.

Outdoor Black-out Fittings

Outdoor lamp fittings intended to provide the low values of illumination permitted during the black-out must not (according to BS/ARP 16, September, 1939) produce more than 0.002 ft.-candle with a minimum spacing-mounting height ratio of four-to-one. While both these values have been retained, a revised specification (February, 1941) allows for an alternative smaller spacing-height ratio of two-to-one. Newly designed lamp fittings to comply with this are announced by the GENERAL ELECTRIC CO., LTD. There are two types, one with a 1½-in. mounting hole and the other is weatherproof, both of them suitable for mounting at three heights. The necessary variation of the distribution of light is governed by the use of different translucent and perforated screens. Thus, at a mounting height of 10 ft. the masking would consist of one opal screen and a black perforated sheet; at 15 ft. two opal screens would be necessary and at 20 ft. one opal screen would suffice. The appropriate masking combinations are clearly marked on each fitting.

G.E.C. weatherproof black-out fitting

Moulded Cable Box

Another example of the present tendency to mould rather than to cast cable terminating accessories, thus avoiding metal in favour of insulating material that does not need to be earthed, is the inexpensive terminal box for low-voltage distributors announced by BRITISH INSULATED CABLES, LTD., Prescot, Lancs. It is a split moulding neatly fashioned to simplify assembly. Two screws hold the halves together and a wooden bush is provided at the lower end for the entry of the incoming cable.

B.I. moulded terminal box

At the upper end of the box there is a spigoted cap, made of the same material as the box, itself with five circular "knock-outs," any or all of which may be used for the exit of single, twin, three, four, or five core cable.

COMMERCE and INDUSTRY

Revised Battery Prices. Power Plant Allowances.

A Compliment from Canada

UNDER the heading "New Departure," *Electrical News and Engineering* (Toronto) makes the following very kind remarks about our new size:—

"The technical press in Great Britain, in common with other publishers, have difficulties to overcome in carrying on under war conditions. One difficulty is shortage of paper, which 'Electrical Review' (the 70 year old British electrical journal) has met by the simple expedient of publishing their journal on small pages—about the same size as 'Readers' Digest.' Although this radical departure was the child of necessity, we confess that we prefer the new format to the rather unwieldly size of previous issues, particularly those of a year or so ago. It would almost be safe to predict that most readers of Britain's leading technical journal will also like the new size and perhaps the popularity of it will be such that the publishers will never return to the large format."

Lighting for Wartime Industry

In its efforts to bring to the notice of industrialists the provisions of the Factories (Standards of Lighting) Regulations, 1941, the National Industrial Electric Lighting Service has recently been busy on the North East Coast. An illustrated lecture dealing with every phase of the new requirements was given at Newcastle on September 11th, by Mr. J. W. Howell (Leeds), to an audience of over 200 factory executives. Col. R. Chapman, C.M.G., D.S.O., D.L., occupied the chair, and Sir Duncan Wilson, C.V.O., C.B.E., late H.M. Chief Inspector of Factories, was among those who contributed to a helpful discussion. The lecture was repeated in the Cleveland Institute, Middlesbrough, on September 12th, to a large audience presided over by the Mayor, Councillor Sir William Crosthwaite.

Torch Battery Prices

The Board of Trade has made an Order under the Goods and Services (Price Control) Act, 1941, fixing revised maximum prices for imported torch batteries. The retail prices fixed for batteries imported from the United States and from Canada remain the same as in the existing order. Small changes have been made in the prices of batteries imported from other countries. In addition, the maximum prices at which manufacturers or importers and wholesalers respectively may sell those batteries are now prescribed.

It is provided that any trader who sells batteries covered by the Order must take steps to bring to the notice of his customers the maximum prices fixed for those batteries. The Order (S.R. & O. 1941 No. 1438) came into operation on September 22nd. Copies are available from H.M. Stationery Office and through booksellers.

Educational Courses

Provided sufficient enrolments are forthcoming the Northampton Polytechnic, St. John Street, London, E.C.1, proposes this autumn and next spring and summer to conduct week-end courses (National Certificate) in engineering, including general electrical and installation work, radio, instrument making, telephony, etc. Full-time and part-time day courses will also be available, but evening classes are suspended for the time being.

Tax Allowances on Power Plant

The Council of the Incorporated Municipal Electrical Association has had before it a statement prepared by an engineer representative regarding the practice adopted in connection with wear and tear allowances on generating plant and it is stated that in the published accounts of the undertaking concerned, the apportionment of plant is shown under two separate headings—"Generation Capital Account" and "Distribution Capital Account." In view of this division the Inland Revenue authorities have declined to admit that the plant included under the heading "Distribution Capital Account" should be subject to the wear and tear allowance of 6¼ per cent.

The Institute of Municipal Treasurers and Accountants some time ago reached an agreement with the Inland Revenue authorities, which covered all electrical generating plant and machinery up to the busbar: everything beyond the busbar is to be regarded as being connected with distribution. All such plant, machinery and cables would, therefore, now be eligible for the allowance of 6¼ per cent.

A number of members of the Association, owners of selected stations and owners of non-selected stations have been communicated with and, from the replies received, it would appear that it is not the general practice to separate the generation assets in undertakings' published accounts.

A.R.P. Protective Clothing

Employers can now obtain without the surrender of coupons (and free of quota restrictions) the A.R.P. clothing needed by the staff they are required to equip under the Civil Defence Act. In order to obtain the clothing employers must send their suppliers a certificate signed by the authority responsible for supervising A.R.P. arrangements under the Act. Certificate forms specifying the clothing covered by the scheme will shortly be obtainable from the various A.R.P. supervisory authorities.

Those employing 30 or fewer employees who have voluntarily carried into effect A.R.P. measures parallel to those imposed by the Act, may also obtain coupon-free supplies against signed certificates obtained from the same source.

Industry in Argentina

Official statistics have just been published of manufacturing industries in Argentina. As they cover the year 1939, they do not take account of the effects of the war and to this extent lose much value. For what they are worth, however, we quote the following particulars:—The number of industrial establishments rose from 49,375 in 1937 (the year of the previous census) to 53,866, and the number of employees from 663,797 to

709,869. There was a rise in primary motive power from 2,176,284 to 2,327,540 HP; the HP of electric motors operated on public supply increased from 630,993 to 729,244; and of motors supplied by private plant from 241,017 to 313,238.

B.E.A. Handbook

After having its first print of 5,500 copies destroyed by enemy action, the 1941 edition of the British Engineers' Association's classified list of members and their manufactures is now being distributed and will be sent free to applicants who can make good use of it if they will write to the Association's offices at 32, Victoria Street, London, S.W.1, on business letter-headings. With its 450 pages the book bears no signs of being a wartime publication, and while under wartime conditions its value appears to be limited the information should prove of great value when peace returns both in demonstrating to prospective buyers at home and abroad the vast number and variety of British-made machines, tools, implements, etc., that are available for their use, and also in putting them in touch with the manufacturers.

All-Electric Day Nursery

In view of the number of married women who are now going into industry it is becoming increasingly important to make the necessary provision for their children while they are at work. In many places nursery centres are being organised and one of these was recently started at the works of W. Martin Winn, Ltd., Darlaston. The centre includes a special rest room for the children, an electrically equipped kitchen and a bathroom using electric water heating. The opening was performed by Miss C. Haslett, director of the Electrical Association for Women, and there were present Mr. Norris Winn, managing director, Miss Joyce Winn, who is in charge of the nursery, and the president and members of the E.A.W. Walsall Branch.

American Tungsten Industry

According to the United States Bureau of Mines, the quantity of concentrated tungsten ore (reduced to an equivalent of 60 per cent. WO_3) sent out from American mines last year was greater than in any previous year except 1916. Compared with 1939, the total of 5,319 short tons represented an increase of 24 per cent., and the average value of the tungsten concentrates rose from $17.11 per unit f.o.b. mines in 1939 to $20.61 last year. Imports of tungsten ore and concentrates last year amounted to 4,833 short tons, an increase of 211 per cent. on 1939.

Imports of Kenya and Uganda

The Commissioner of Customs for Kenya and Uganda refers in his report for last year to the radical adjustment of the sources of supply of imported goods which then took place, as a result of the war. Increased quantities of manufactured articles arrived from South Africa, Canada and Australia to help replace European supplies, and India greatly expanded her share of the textile trade.

A forecast of trade in 1941 must, he says, be viewed in the light of necessary curtailment of expenditure by the community in the general interests of the Empire's war effort, in the direction of eliminating Empire production of manufactured articles not required for war purposes, economy of shipping space, avoidance of expenditure of hard currencies and the savings campaign. In view of all these considerations the opinion of the Commissioner is that a decline in imports will be inevitable.

The following statistics of the electrical goods and machinery import trade in 1940 have been extracted from his report, notes of increases or decreases compared with 1939 being added.

	1940	Inc. or dec. on 1939
Electric wires and cables—	£	
Total	51,800	+ 28,200
From United Kingdom	51,200	+ 32,300
,, Belgium	500	— 2,100
Electric lighting accessories and fittings—		
Total	14,200	— 3,100
From United Kingdom	14,100	+ 5,500
Electrical goods and apparatus not elsewhere specified—		
Total	28,000	— 2,900
From United Kingdom	20,000	—
,, Hong Kong	2,800	+ 2,700
,, South Africa	2,200	+ 2,200
,, United States	1,400	— 1,500
Electric light bulbs—		
Total	8,800	+ 2,500
From United Kingdom	8,400	+ 4,500
Telegraph and telephone instruments and apparatus—		
Total	22,700	— 10,000
From United Kingdom	22,300	— 8,200
Radio apparatus—		
Total	20,300	— 6,000
From United Kingdom	9,800	+ 2,400
,, Holland	3,500	— 6,800
,, United States	6,900	— 500
Electrical machinery and parts—		
Total	40,000	— 11,000
From United Kingdom	35,200	+ 12,800
,, United States	3,200	+ 200
,, Canada	700	+ 700
,, Belgium	400	— 23,400

New French Electrical Company

The German official news agency reports that the Schneider-Creusot concern has founded, in collaboration with the Société des Forges et Ateliers de Constructions Electriques Jeumont, a company called Matériels de Traction Electriques. The new company, working with the parent companies, will carry out electrification work, and negotiate contracts with the State for machinery and electrical apparatus.—*Reuter's Trade Service* (Paris).

B.S. Standard for Glazing

The British Standards Institution has just issued a code of practice for the glazing and fixing of glass for buildings (B.S.973-1941). It recommends, among other things, that the work should be carried out by qualified craftsmen and that the method of glazing or of fixing should be such that movement of the structure does not transmit any strain to the glass.

X-ray Weld Inspection

Two 1,000-kV industrial X-ray units have recently been installed in the United States for inspecting boiler welds. These are said by the *Electrical World* to exceed by 500-kV the rating of the largest sets yet built and to be capable of radiographing 8-in. steel. Babcock & Wilcox state, regarding the first of these, that inspection time has been reduced from 3.5 hr. per ft. to 3 min. for 4½-in. plate. Controls are in a separate concrete-walled room, where single-phase

180-cycle current is supplied from a motor-generator.

The other unit has been installed by the Combustion Engineering Co. which states that, at a focal distance of 48 in., the machine will radiograph 5-in. thick plate in about 5 min. and that a 3-in. plate can be penetrated in 48 sec. The current required is 3mA at 1,000 kV.

Industrial Welfare Conference

A three-day conference held recently at Reading University by the Industrial Welfare Society was attended by about 250 welfare supervisors, personnel managers and company directors. At the opening session, when Mr. R. R. Hyde, Director of the Society, presided, Lord Forrester (Enfield Cable Works, Ltd.) suggested that a proper balance of industry in all areas might ease the problem of unemployment in peacetime. Wartime industry, he thought, might be turned over to the building of new houses, scientifically designed for the comfort of workers. On the second day a paper was read by Mr. R. S. C. Beresford (Frigidaire, Ltd.) on "The Employment Department in Wartime." The Essential Works Order, he said, insisted that welfare arrangements should be so comprehensive that work was elevated to the highest possible level of congeniality and safety.

Fire Prevention in Business Premises

The new scheme of fire-watching for industrial and commercial buildings has now been issued as the Fire Prevention (Business Premises) No. 2 Order, operating as from September 22nd. It stipulates that proper sleeping, washing and sanitary facilities shall be provided and a scale of subsistence allowances (defrayable by the Exchequer) is laid down. A 49-page "Explanatory Memorandum" has been issued in connection with the Order. This is obtainable, free of charge, from the Publications Department, Ministry of Home Security, Horseferry House, Thorney Street, S.W., or the Scottish Home Department, St. Andrew's House, Edinburgh.

Fuel Economy

The Mines Department has drawn the attention of large-scale consumers to the need for the utmost economy in the use of fuel during the coming winter, whether it takes the form of coal, coke, oil, electricity or gas. It is hoped that these consumers will set an example to the public to whom an appeal for economy has also been addressed, an appeal which is being supported by E.D.A.

Technical Officers for the Forces

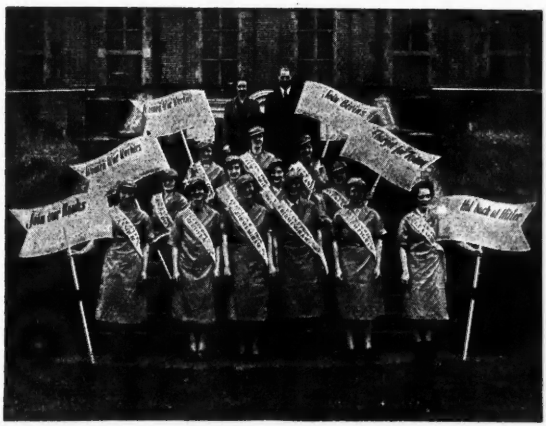
In order to make available a number of men qualified for appointment as technical officers in the Forces, it has been decided to review the cases of all civil, mechanical and electrical engineers at present engaged in civilian work who were under the age of 25 when they registered for military service, and who come within the scope of the University Joint Recruiting Boards. Arrangements will be made to submit to the Boards the cases of all those who, because they were treated as reserved or had had their calling up deferred, have not hitherto been interviewed.

The Committee on Skilled Men in the Services has been invited to extend its inquiries to include the commissioned ranks in all three Services.

Birmingham Women War Workers

On September 6th, a campaign was inaugurated in Birmingham for encouraging women to volunteer for work in munitions factories. The campaign is sponsored by the Ministry of Labour and the Ministry of Supply, and manufacturers have co-operated in a programme of events which will be spread over a period of one month.

One of the attractions of the first week was an exhibition split up into sections at various vantage points of the city. In some sections, girls could be seen carrying out wartime jobs normally performed in the factory. In other sections, industrial tableaux epitomised the invaluable work which women can do, with a minimum of training. A feature of the opening day was a procession through the streets of the city. Various machines and implements used in modern warfare were paraded through the streets and manufacturers devised their own contributions.



Girl employees of the G.E.C. helping the Birmingham women war workers' campaign

The General Electric Co., Ltd., assisted in the campaign by erecting a static exhibit on one of the numerous exhibition centres and also by providing a mobile beacon for the procession in which G.E.C. girl employees carrying appropriately worded banners also took part. The beacon was of the neon type similar to those used by the R.A.F. for guiding bombers home. This was towed behind an R.A.F. lorry and continually flashed the "V" signal.

The G.E.C. stand, at the exhibition, was surmounted by a huge poster bearing the words

"5,000 happy G.E.C. girls are helping to beat Hitler—come and join them," and displayed large photographs showing scores of girls working in one of the Company's factories.

South African Trade

Regulations gazetted by the South African Government on September 10th, provide that from September 15th no goods other than specified exemptions, which include articles produced in the British Commonwealth apart from Canada and Newfoundland, may be imported into the Union or South-West Africa except under permit issued by the Controller of Imports and Exports; moreover until further notice no permit for certain specified articles will be issued unless the articles are produced in the British Commonwealth other than Canada and Newfoundland. Exports are also subject to control.

Canadian Electrical Imports

According to figures published by the Dominion Bureau of Statistics, Ottawa, imports of electrical apparatus during June amounted in value to $2,308,000 as compared with $1,813,000 in June, 1940.

Fruit Bottling

On account of the increasing activity on the "Kitchen Front," those responsible for the running of electrical showrooms and demonstration theatres will be interested to learn that the snap vacuum closures for bottling fruit, etc., made by the well-known electrical concern, Graham Farish, Ltd., Bromley, have been further improved this season. The caps used are now made slightly flexible so as to enable jars which are slightly oval to be used and to eliminate the need for care in selecting the jars. Rims have also been formed round the bases of the closures in order to hold the rubber bands in position. Already this season 20 million closures have been disposed of and this number has been limited only by the company's production capacity.

Indian Mineral Deposits

Since the outbreak of war attention has been directed to the possibility of developing a chrome industry in India on a large scale, and a bulletin on mineral chromite issued by the Geological Survey deals with this question systematically, discussing the occurrences of the mineral in India, its various uses, and the manufacture of chromium, ferro-chrome, chrome-bricks, etc. According to an article on the subject in the *Indian Railway Gazette*, the country's production at present is less than 5 per cent. of the world output. Mysore State is the chief producing centre of chrome ore, accounting for nearly half of the total, while about a third comes from the Hindubagh mines near Quetta. With the development of cheap power, there appears to be a bright future for the smelting of chrome ore in electric furnaces to produce ferro-chrome.

Officers of the Geological Survey have reported that roughly one million tons of celestite occur in the Trichinopoly district of Madras. The discovery of celestite in this region was originally made by Dr. H. Warth, Superintendent of the Government Museum, Madras, nearly fifty years ago, but appears to have been forgotten. He then stated that celestite in fibrous plates from one to three inches thick occurred very profusely, and that there was certainly enough to be of commercial importance, provided this strontium sulphate could be utilised. Strontium compounds are used in cathode-ray tubes and other devices for the emission of electrons and also for tracer bullets and signals for ships and aeroplanes. Strontium sulphate is used in sealing compositions for electric batteries, etc. The world's biggest deposits of strontium are in the West of England and these, together with German celestite, have furnished the world's requirements so far.

E.W.F. Move

The Electrical Wholesalers' Federation has moved to 5, Vicarage Road, Henley-on-Thames. The telephone number is unchanged.

New Catalogue

Watson & Sons (Electro-Medical) Ltd., 76, Castle Street, Reading, Berks.—Illustrated booklet (No. 210) technically describing "Power Mobilix" X-ray outfits, which are shockproof and mobile for use between beds in hospital wards.

Trade Announcement

Macrome, Ltd., announce the opening of the following branches :—111, The Headrow, Leeds (telephone : Leeds 22657), serving Yorkshire areas, and 15, King Square Avenue, Bristol (telephone : Bristol 26489), serving Western England and South Wales. These branches, acting as collection and delivery centres, will provide a convenient service to firms making use of the Macrome treatment.

TRADE MARK APPLICATIONS

THE following applications have been made for British trade marks. Objections to any of them may be entered within one month from September 17th :—

LEWMEX. 615,388. Class 9. Wire for electrical purposes. London Electric Wire Co. & Smiths, Ltd., 24, Queen Anne's Gate, Westminster, London, S.W.1.

NORLITE. B615,426. Class 11. Light diffusing glass screens being parts of lighting fittings. British Indestructo Glass, Ltd., 27-29, Park Royal Road, London, N.W.10.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following :—

Stocking mending machine (invisible stitching) both hand and bench models.

G. Braulik (present address) agent for "Metaphone" telephone set.

Present suppliers of lathes made by Britannia Tool Co.

ELECTRICITY SUPPLY

Further Price Reductions.

Doncaster.—MODIFIED LIGHTING.—The Rural District Council is to install modified street lighting at Edlington.

Glasgow.—HEATING POLICE KIOSKS.—The Corporation Police Committee has agreed that Belling plate type heaters shall be used in 30 police signal kiosks.

Inverness.—LIGHTING FLAT-RATE REDUCTION.—The Town Council is reducing the lighting flat-rate charge by ½d. per kWh.

Littleborough.—REDUCED CHARGES.—At a recent meeting of the Urban District Council the Electricity Committee recommended the following reductions in charges: Maximum flat rate, first 150 (instead of 500) kWh at 4½d. per kWh; minimum charge reduced from £1 to 10s. per annum; all-in charge reduced from ¾d. to ⅝d. per kWh; rateable value charge to be 10 per cent. over £20 instead of 15 per cent. In addition a sliding scale had been fixed for power consumers giving slight all-round reductions. The proposals were approved.

London.—COLLIER SHOOTS DOWN AIRCRAFT.—The report of the Fulham Electricity and Lighting Committee presented to the Council last week contains the following item:—The Council will be pleased to learn that the officers and crew of the S.S. Fulham III [one of the Department's colliers] were recently responsible for bringing down an enemy aircraft which attacked it. The S.S. Fulham III was the first ship to open fire on the aeroplane and was the first to secure a hit. A suitable letter of congratulation has been sent to the officers and crew of the boat on behalf of the Council."

A.R.P. INSTALLATIONS.—The London County Council is to heat various shelters at a cost of £4,880. Temporary electric lighting is to be provided at ambulance depots (£100) and rescue service stations (£500).

POWER POINTS IN SHELTERS.—Hampstead Borough Council has decided to provide power points for electric kettles and radio sets in surface shelters.

Lossiemouth. — CHEAPER ELECTRICITY. — Reductions in electricity charges are announced. The lighting flat-rate is being lowered by ½d. (to 5½d. per kWh) and the charge for heating and power by ¼d. per kWh.

Malvern.—ELECTRIC PUMPING PLANT.—The Urban District Council is to have electric pumping plant installed at the waterworks.

Margate.—PRICE INCREASE OPPOSED.—The Town Council has decided to oppose an application by the Isle of Thanet Electric Supply Co., Ltd., to the Electricity Commissioners seeking to increase the price of electricity from 33⅓ to 50 per cent. above the basic pre-war rates. The Council suggests that any deficiency resulting from the special local conditions prevailing should be borne by the Government and should not be met by an increase in tariffs.

Nelson.—LOANS.—The Corporation has received sanction from the Electricity Commissioners to the borrowing of £5,415 and £1,009 for meters and other equipment. Application is being made for a further loan of £2,000 for electric cookers for hire and hire-purchase.

Nelson Loan for Cookers.

Northern Ireland.—SHELTER HEATING.—It was reported to the Committee of Governors of Lisburn and Hillsborough District Hospital recently that the Ministry of Home Affairs had written stating that their technical advisers did not recommend the installation of steam heating in air-raid shelters, nor was it permitted. The Ministry suggested that some simple form of temporary heating, such as by electricity, should be considered. The clerk stated that the steam heating installation had already been carried out, and it was decided to write to the Ministry pointing out that it had been necessary for the Governors to act before the cold weather set in.

Portland.—METER RENTALS.—The U.D.C. Electricity Committee has decided that the 10 per cent. war increase shall not be applied to the charges for the rental of meters and domestic apparatus.

Rushden (Northants). — INSTALLATIONS IN SHELTERS.—The town's semi-surface shelters have all been connected to the electricity supply and equipped with emergency lighting. Tubular heating has been approved, but the installation has been delayed.

Salford.—MODIFIED LIGHTING.—The Corporation Light, Heat & Power Committee has decided to install an extended system of "starlighting" along all the main bus and tram routes.

Southport.—LOAN.—Following the acquisition of the Birkdale undertaking the Council is making application to the Electricity Commissioners for sanction to borrow £1,850 for expenditure on mains, etc., required up to September 30th, 1942.

Application is also being made for consent to the payment of the following items of expenditure required for the Birkdale undertaking out of the surplus revenue of the undertaking for the year ending March 31st, 1942: New meters, £750; domestic appliances, £1,000; services, £500; change over, DC to AC, £750.

Wellingborough. — SHELTER LIGHTING. — Wellingborough Electric Supply Co., Ltd., is to install electric lighting in the town's air-raid shelters. The accepted estimate provides for a fixed charge of 4s. 6d. for each 100 W of lighting installed, and 1d. per kW.

Overseas

Australia. — MELBOURNE ACCOUNTS. — The accounts of the Melbourne Electric Supply Department for the year ended September 30th, 1940, shows that the total revenue was £815,087, as compared with £763,693 in 1938 (the 1939 accounts related to nine months only, due to an alteration in the financial year). Expenditure was £689,229 (£630,935 in 1938), and after meeting various charges there was a net profit of £169,596 (£162,990). Data furnished by the city electrical engineer (Mr. B. Woodfull) shows that 160 million kWh was generated and purchased last year (32 million kWh generated by the Department). Sales for residential purposes amounted to 8.6 million kWh, at an average price of 1.989d. per kWh; for commercial purposes 79.1 million kWh at 1.562d.; for industrial uses 49.0 million kWh at

0.977d.; and for traction 8.3 million kWh at 0.700d. The cost of electricity purchased was 0.553d. and of generation 0.507d. (fuel, 0.238d.; operating expenses, 0.132d.; and repairs and maintenance, 0.137d.).

Canada.—POWER FROM BEAUHARNOIS.—Anticipating the previously planned delivery date by more than two months, Beauharnois Power at the end of August increased its supply of power to the Hydro-Electric Power Commission of Ontario by 50,000 HP, bringing the total taken by Ontario Hydro to 200,000 HP. This earlier delivery was made possible by the fact that the lines constructed to carry the power were finished ahead of the scheduled time. Beauharnois now has an installed capacity of 500,000 HP; the present load is 450,000 HP of which 200,000 HP goes to Ontario Hydro, and the balance to the Montreal Power Co., and what is known as the "local load" principally St. Lawrence Alloys, Montreal Cottons (Valleyfield) and Defence Industries, Ltd.

With regard to the proposed acquisition of Beauharnois by Quebec Province, it is understood that definite negotiations between Government representatives and the company have not yet been commenced, but that the Government representatives are gathering information in preparation for such negotiations.

China.—ELECTRICAL POSITION.—Power plants in the part of China controlled by the Chungking Government are stated by a correspondent to number 150 with a combined capacity of 61,327 kW. This compares with 460 plants having a capacity of 631,165 kW in the whole of China before the war began. In the present area, however, there has been an increase in capacity of 20.7 per cent. during that period. As the Japanese penetrated into the country plants were removed from the war areas and erected elsewhere, a remarkable achievement in the circumstances.

The National Resources Commission of the Ministry of Economic Affairs is planning the construction of a further seven plants, and hydraulic power schemes are being examined.

Manchukuo. — NEW TRANSMISSION LINE.— A Hsinking dispatch states that the 250-kV transmission line which has long been under construction between the Suiho hydro-electric plant on the Yalu River and the Anshan plant in South Manchukuo has been completed. It is stated that 19 million yen has been spent on the line and 9 million yen on the Anshan station.

Sweden.—POWER PLANS.—The Waterfalls Board is asking the Government for Kr. 26,275,000 for the continued enlargement of generating stations and the regulation of lakes and watercourses. The Board proposes that the Riksdag should be requested to grant an initial sum of Kr. 6,000,000 for the financial year 1941-1942, for a new power station on the Midskogsforsen rapids on the Indalsälven River. This station is planned for a fall of about 29 metres and a flow of 350 cu. m. per sec. It is estimated that the station will have an annual output of 600,000,000 kWh. The cost of construction is placed at Kr. 32,500,000. If work starts at once the station will probably be completed sometime in 1944. For the budget year 1942-43 grants are requested of Kr. 2,400,000 for the continued construction of the Hojum power station at Trollhättan, Kr. 7,500,000 for the completion of the Torpshammar station, Kr. 1,375,000 for the regulation of the Holmsjön and Leringen lakes, Kr. 12,000,000 for the Midskogsforsen plant, and Kr. 3,000,000 for a smaller station.—*Reuter's Trade Service.*

United States.—NEW JERSEY COMPANY'S EXTENSIONS.—By the installation of a 50,000-kW set at its Marion station the Public Service Electric & Gas Co., of New Jersey, has raised its generating capacity to 887,700 kW, and a further set of similar size is now being installed in the same station. At the company's Burlington plant work is proceeding upon the installation of a 100,000-kW set which will raise the station's capacity to 225,000 kW and the total generating plant of the company to 1,037,000 kW. The *Electrical World* states that by the winter of next year the company will have increased the capacity of its system by 350,000 kW, about 51 per cent., since 1937.

Yugoslavia.—DANUBE WATER POWER SCHEME.—The Germans are said to be contemplating a project for using the Danube rapids at the Iron Gate in Croatia to produce electricity. A hydro-electric station will be constructed there and the power transmitted to Zagreb.

TRANSPORT

Grimsby.—REDUCING FLASHES.—Mr. J. C. Whiteley, manager of the Transport Department, reported at a meeting of the Transport Committee that flashes on the overhead equipment were caused by chips in the wire and could be obviated by the use of new wire. The Committee decided to replace old wire forthwith at a cost of £800.

Southend-on-Sea.—TROLLEY-BUS FARES.—At a meeting of the Town Council on September 16th, the chairman of the Transport Committee was asked for an assurance that the existing fares and stages would be the same when the trams were replaced by trolley and motor buses. He replied that the fares and stages would be the same after the conversion as those now in force, but that application had been made some months ago by the Corporation for authority to vary the present fares and if such authority were granted it would be desired to amend the fare tables.

Walsall.—YEAR'S PROFIT.—The Corporation Transport Committee reports net surpluses of £20,434 on the motor-buses and £4,214 on the trolley-buses for the past year. The Committee states that this surplus on the services cannot be considered in any way unreasonable as it only represents a profit of approximately one-eighth of a penny for every passenger carried.

RADIO & TELEPHONY

Great Britain.—RADIO RELAY STATISTICS.—At March 31st last there were 314,906 subscribers to 282 radio relay exchanges, compared with 297,691 subscribers to 284 exchanges at December 31st, 1940.

Following an interview with Mr. Bryan Groom, managing director of Galashiels Relay, Ltd., Peebles Town Council at its last meeting sanctioned the introduction of a radio relay system at Peebles.

Japan.—NEW BROADCASTING STATION.—A Japanese broadcasting station has been opened on the island of Palao in the Japanese-owned Caroline group, 600 miles east of the Philippines, states a *Reuter* message from Tokyo.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Palestine Electric Corporation, Ltd.—Presiding at the annual meeting on September 16th, Viscount Samuel (chairman) said that considering the difficulties brought about by the prevailing conditions, the business of the undertaking in 1940 was well maintained. The rising costs of operation, distribution and administration had compelled them to increase the rates for supply. The power houses operated satisfactorily throughout the year. Twenty-nine transformers with a total capacity of 3,159 kVA were put into commission in 1940, mostly to meet the requirements of military establishments, and their transmission and distribution systems were extended by 78 km. The total length of high-voltage transmission lines and cables in service on December 31st, 1940, was 1,267 km. and of low-voltage distribution lines 1,193 km.

Ferranti, Ltd., are seeking shareholders' authority to double their borrowing powers. The board at present can borrow up to the amount of the paid-up capital (£800,000). The increased borrowing powers are necessitated by the considerable expansion of the business of the company. The directors point out that the increased facilities will be used for the purpose of current requirements of the business and not in respect of items of the nature of capital expenditure. A meeting to consider the resolution was to be held on Tuesday last (September 23rd).

Babcock & Wilcox, Ltd., are holding a meeting on September 25th at which a proposal will be submitted that all preference and ordinary shares in the company shall be converted into stock.

Richard Johnson, Clapham & Morris, Ltd., have announced a final ordinary dividend of 11¼ per cent., making 15 per cent. for the year to June 30th (unchanged).

The British Vacuum Cleaner & Engineering Co., Ltd., has declared a dividend of 10 per cent. on the ordinary shares, less tax, for the period October 1st, 1939, to March 31st, 1941. The net profit is given as £29,910, against £29,783.

Newman Industries, Ltd., propose to increase their capital from £208,000 to £273,000 by the creation of 650,000 2s. ordinary shares. A new issue is to be made to existing shareholders at 3s. per share.

The Midland Electric Corporation for Power Distribution, Ltd., is paying an interim dividend of 3 per cent. (unchanged).

The West London & Provincial Electric & General Trust, Ltd., is maintaining its interim dividend at 2 per cent.

The Hoffmann Manufacturing Co., Ltd., is repeating its interim ordinary dividend of 7½ per cent. free of tax.

The Scottish Power Co. has again declared an interim dividend of 2½ per cent.

Waite & Son, Ltd., have declared a dividend of 2 per cent. (same) for the past year.

The British Aluminium Co., Ltd., is again paying an interim ordinary dividend of 3 per cent., less tax.

Stothert & Pitt, Ltd., have announced a first and final dividend of 10 per cent., plus a bonus of 2½ per cent. (same). The profit for the past year, after meeting special war expenses, were £170,623 against £133,958 for 1939-40.

The Midland Counties Electric Supply Co., Ltd., is maintaining its interim dividend at 2½ per cent.

Hopkinsons, Ltd., announce an interim dividend of 5 per cent., as last year.

Lancashire Dynamo & Crypto, Ltd., is again paying an interim dividend of 5 per cent.

New Companies

Park Royal Electrical (Maintenance) Co., Ltd. Private company. Registered September 15th. Capital, £300 in 300 shares of £1 each. Objects: To carry on the business of electrical engineers and contractors, etc. The directors are: J. Waggett, 54, St. George's Drive, Carpenders Park, Herts; N. G. Smith, 3, Wharncliffe Drive, Southall, Mdx.; E. W. Heathfield, 17, Calder Avenue, Perivale, Mdx.; and F. Jones, 63, Windmill Road, Brentford, Mdx. Solicitors: Ferris, Roberts, Thomas & Co., 182, High Street, Acton, W.3. Registered office: 203, High Street, Acton.

W. O. Davies & Co., Ltd.—Private company. Registered September 13th. Capital £2,000. Objects: To acquire the business of mechanical, electrical and general engineer, carried on by W. O. Davis, at 53a, Hill Street, Coventry, as W. O avis & Co. Directors: W. O. Davis and Mrs. riel A. Davis, both of 53a, Hill Street, Cove . y. Secretary: W. O. Davis. Registered office: 53, Hill Street, Coventry.

Marine Instruments, Ltd.—Private company. Registered September 13th. Capital £100. Objects: To carry on the business of manufacturers of and dealers in nautical instruments, engineers, electricians, metal workers, etc. Subscribers: G. Conrad, 103, Phyllis Avenue, New Malden; and C. H. Treble, 15, Maybank Avenue, Sudbury, Wembley, Middlesex. Solicitors: Clifford-Turner & Co., 11, Old Jewry E.C.2.

E. F. Collins & Son, Ltd.—Private company. Registered September 12th. Capital £1,000 in 1,000 shares of £1 each. Objects: To carry on business of mechanical and electrical engineers etc. The permanent directors are: E. F. Collins, D. C. Collins and Mrs. B. A. Collins, all of 145, Shirley Road, Croydon, Surrey. Secretary: Thos. Corrigan, 6/7, Queen Street, E.C.4. Registered office: 145, Shirley Road, Croydon.

O. B. Engineering Co., Ltd.—Private company. Registered September 5th. Capital, £100. Objects: To carry on the business of installers of master and secondary clocks, dials, batteries, alternators, dynamos, watches, clocks, chronometers, electrical and other apparatus, etc. The

first directors are: F. Hope-Jones, 90, Manor Drive, Hinchley Wood, Surrey, and three others. Registered office: 1, Penrhyn Road, Kingston-on-Thames.

Anglo-Swiss Precision Works, Ltd.—Private company. Registered September 12th. Capital £5,000 in 2,500 preference and 2,500 ordinary shares of £1 each. Objects: To carry on the business of mechanical and electrical engineers, etc. The subscribers are: W. G. L. Hadley, 20, Brockenhurst Gardens, N.W.7.; and W. C. Wileuman, The Cottage, Carmelite Convent, Nascot Wood Road, Watford. Solicitors: Elkin, Henriques & Harford, 62, Clifton Hill, N.W.8.

Companies' Returns

Statements of Capital

Rangoon Electric Tramway & Supply Co., Ltd.—Capital, £1,000,000 in 250,000 preference, 550,000 ordinary and 200,000 new shares of £1. Return dated May 14th. All preference and ordinary shares taken up. £735,000 paid on 250,000 preference and 485,000 ordinary shares. £65,000 considered as paid on 65,000 ordinary shares. Mortgages and charges: £200,000.

Southern Areas Electric Corporation, Ltd.—Capital £850,000 in £1 shares. Return dated June 4th, 1941. 783,484 shares taken up. £652,707 paid on 611,507 shares (£1 per share, plus premiums of 3s. on 51,000, 2s. on 110,500 and 1s. on 450,000 shares). £172,175 8s. considered as paid (£1 per share on 171,977 shares, plus premium of 2s. per share on 1,984 shares). Mortgages and charges: Nil.

Electricity Distribution of North Wales & District, Ltd.—Capital, £400,000 in 400,000 ordinary shares of £1 each. Return dated April 3rd (filed May 17th). All shares taken up. £396,500 paid, plus £14,587 10s. in respect of premiums, being 1s. 6d. per share on 194,500 shares. £3,500 considered as paid. Mortgages and charges: £51,510.

W. J. Furse & Co., Ltd.—Capital £35,000 in 9,000 preference and 26,000 ordinary shares of £1. Return dated June 3rd, 1941. 9,000 preference and 22,860 ordinary shares taken up. £12,566 paid on 12,566 ordinary shares. £19,294 considered as paid on 9,000 preference and 10,294 ordinary shares. Mortgages and charges: Nil.

Electrical Appliances Guarantee Co., Ltd.—Capital, £1,000 in 1,000 ordinary shares of £1 each. Return dated May 14th. 800 shares taken up. £800 paid. Mortgages and charges: Nil.

Electric Supplies (Bloxwich), Ltd.—Capital, £5,000 in £1 shares. Return dated May 14th. 2,375 shares taken up. £1,633 paid. £742 considered as paid. Mortgages and charges: £1,580.

Hall Telephone Accessories (1928), Ltd.—Capital, £500,000 in 10s. shares. Return dated May 22nd. 645,120 shares taken up. £203,148 10s. paid on 406,297 shares. £119,411 10s. considered as paid on 238,823 shares. Mortgages and charges: £211,036.

A. Berkeley, Ltd.—Capital, £10,000 in 10,000 shares of £1 each. Return dated May 22nd. 7,800 shares taken up. £7,800 paid. Mortgages and charges: Nil.

Allen West & Co., Ltd.—Capital £700,000 in £487,500 stock and 850,000 shares of 5s. Return dated May 27th, 1941. £487,500 stock taken up. £447,935 5s. paid. £39,564 15s. considered as paid. Mortgages and charges: £224,842.

Anglo-American Telegraph Co., Ltd.—Capital £7,000,000 in £193,900 ordinary stock, £3,403,050 preferred ordinary stock and £3,403,050 deferred ordinary stock. Return dated May 29th, 1941. All stock taken up. £600,000 paid. £6,400,000 considered as paid. Mortgages and charges: Nil.

Craven Hydro-Electric Supply Co., Ltd.—Capital £5,000 in 5,000 shares of £1 each. Return dated July 1st, 1940 (filed May 30th, 1941). All shares taken up. £9 paid. £4,991 considered as paid. Mortgages and charges: £5,000.

Barlborough Electric Supply Co., Ltd.—Capital £3,000 in £1 shares. Return dated June 2nd, 1941. 2,967 shares taken up. £2,967 paid. Mortgages and charges: Nil.

Premier Accumulator Co., Ltd.—Capital £100 in £1 shares. Return dated June 2nd, 1941. Two shares taken up. £2 paid. Mortgages and charges: Nil.

New Era Electrical Manufacturers, Ltd.—Capital, £100,000 in 50,000 ordinary and 50,000 preference shares of £1 each. Return dated May 21st. 1,504 ordinary shares taken up. £1,504 paid. Mortgages and charges: Nil.

Mortgages and Charges

Davey Paxman & Co. (Colchester), Ltd.—Satisfaction to the extent of £500 on June 30th, 1941, of trust deed dated May 31st, 1938, and registered June 7th, 1938, securing £100,000 debenture stock. (Notice filed September 8th, 1941).

Rotoplunge Pump Co., Ltd.—Satisfaction in full on August 15th, 1941, of debenture registered February 27th, 1940, securing sums not exceeding £2,000.

Nevelin Electric Co., Ltd.—Particulars filed of series of debentures for £7,500 and £4,400, authorised August 29th, 1941, charged on the company's undertaking and property, present and future, including uncalled capital and unpaid calls (subject to prior charges), the amounts of the present issues being £5,000 and £4,400 respectively.

Bankruptcies

Major Manufacturing Co. (a firm), battery manufacturers, Great Tower Street, E.C.—The first meeting of creditors was held on September 16th at London Bankruptcy Buildings. The debtors (C. J. Berners and Irene F. Berners) commenced the above business in February, 1940, with £150 capital. They do not admit insolvency and have lodged a joint statement of affairs showing liabilities of £1,700 against assets valued at £2,473. A resolution was passed for Mr. M. M. Donn (M. M. Donn & Co.), accountant, to act as trustee and wind up the estate in bankruptcy with the assistance of a committee of inspection.

Liquidations

Finlay's Radio, Ltd.—Meetings, October 23rd, at 185-188, High Holborn, London, W.C.1, to receive an account of the winding up (pursuant to section 245 of the Companies' Act, 1929) by the liquidator, Mr. C. Latham.

STOCKS AND SHARES

TUESDAY EVENING.

THE cheerful manner in which Stock Exchange markets and prices had been moving during the earlier part of the month suffered a check during the past few business days, when the news from the Russian front was read as being of serious import. The struggle for possession of Leningrad, Kiev and the Crimea was watched with the keenest interest, in spite of the argument that whatever happened would make no fundamental difference to the financial position in the money market of to-day. The Government's policy of cheap money, reiterated almost *ad nauseam*, is the leading principle that governs the investment values of to-day, and the manner in which gilt-edged stocks retain their high prices is evidence of the general recognition of this fact. Despite a certain heaviness round the House, rises of 1 to 2 points have occurred in London Passenger Transport Board senior stocks and in London Electric Transport 2½ per cent.

Home Railway Suspense.

At some early date, it is expected that the Government will announce its intention in connection with War Damage Insurance as it applies to the Home Railway companies. Agreement was reached last month between the Government, the four main line railway companies and the London Passenger Transport Board, as to the revised financial arrangement for the control of the railways, but the vital point of War Damage Insurance was left in suspense. Conflicting views as to how the insurance scheme is likely to operate have been responsible for fairly violent fluctuations in the prices of Home Railway stocks. Southern Railway 5 per cent. preferred stock is 3 down at 61½, at which price the stock holds attraction for the speculative investor.

Transport Board Valuation

The Railway and Canal Commission having given judgment in favour of the London Passenger Transport Board on the rating valuation appeal made by the latter from the findings of the Railway Assessment Authority, has done the stockholders of Transport "C" a good turn. The price of the stock rose from 42 to 44 on a reduction by £649,000 in the net annual rateable value of the undertaking. The figure is now lowered to £945,275 for the five years 1936-41.

Price Fluctuations

The upward movement which has been in course during the past six weeks in the stocks and shares that are listed here every week, has come to something of a halt. For this the news from the Russian front is partly responsible, although there must also be reckoned the natural reaction which takes place after a protracted movement in prices one way or the other. Equipment and manufacturing shares keep very firm, with a rise of 3s. 9d. in Lancashire Dynamo a prominent feature. The shares had been standing at a price at which the yield on the money offered obvious temptation, and at the increased price of 61s. 3d. the return is still 6½ per cent. Improvements of 1/16 in Crabtree to 28s. 9d., Hall Telephone to 15s. and Johnson & Phillips to 52s. 6d., go against declines of 2s. 6d. in General Electrics to 77s. 6d. and of 1/16 in British Aluminium, Mather & Platt and Tube Investments. Associated Electrical ordinary shares at 43s. 9d. are 1/16 harder. Electricity supply shares are steady, the only quotable change being a rise of 9d. to 38s. 3d. in Midland Counties.

Overseas

Brazilian Traction shares, after their dramatic rise earlier in the month, have gone back to 10½, being ⅞ down on the week. Inquiry has arisen, however, for dollar stocks, more particularly those in the Canadian section. Montreal Power shares at 28 are 1½ higher, and Shawinigan at 17½ are similarly better. A further rise of 5 points in Mexican Light & Power first bonds to 55, makes a gain of 10 on the fortnight. In the sterling stocks, the more optimistic feeling which now obtains in regard to South Americans is reflected in a rise of 3 points in Anglo-Argentine Tramways, 4 per cent. income stock which now stands at 7½. Attention is being turned towards Malayan tin shares; as a result, Perak Hydro-Electrics came into notice and put on 9d. to 18s. 3d.

British Vacuum

British Vacuum Cleaner shares have risen 3s. to 11s. 3d., although the dividend just declared of 10 per cent. goes against 12½ per cent. for the previous twelve months, although the latter, by the way, was not fully earned. The 10 per cent. dividend is declared in respect of a period of eighteen months, but assuming an annual continuance of this rate, the yield on the money at the present price of 11s. 3d. will be £4 9s. per cent.

Oriental Telephone

Buyers of Oriental Telephone shares are trying to obtain them at 3⅝ on the expectation that the company will distribute a substantial sum per share by way of return of capital when the sale of the three Indian telephone companies is completed. Although no official announcement has been made, it is taken for granted that the Oriental Telephone Co. has sold its three Indian undertakings, on terms yet to be published. Some people look for a return of as much as £3 per share, though this is merely surmise. Possibly the Government of India will be in no hurry to pay, during the war, the money involved in the purchase. It is well known, however, that India is, in

(*Concluded on page* 317.)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend 1939–40	Dividend 1940–41	Middle Price Sept. 23	Rise or Fall	Yield £ s. d.
Home Electricity Companies					
Bournemouth and Poole	15	12½	52/6	..	4 15 5
British Power and Light	7	6	25/–	..	4 16 0
City of London	7½	7	25/9	..	5 8 9
Clyde Valley	8	8	37/6	..	4 5 4
County of London	10½	8	35/9	..	4 9 5
Edmundson's:					
7% Pref.	7	7	32/6	..	4 6 2
Ord.	6	6	27/6	..	4 7 3
Elec. Dis. Yorkshire	9	9	40/–	..	4 10 0
Elec. Fin. and Securities	12½	12½	42/6	..	5 17 8
Elec. Supply Corporation	11½	10	42/6	..	4 14 0
Isle of Thanet	2	Nil	8/6	..	—
Lancs Light and Power	7½	7½	33/9	..	4 9 0
Llanelly Elec.	5½	5½	21/–	..	5 4 9
Lond. Assoc. Electric	5½	4½	19/6	..	4 12 4
London Electric	7	7	24/6	..	5 14 3
London Power Deb. Red.	5	5	103	..	4 17 2
Metropolitan	10	8	36/3	..	4 8 5
Midland Counties	8	8	38/3	+9d.	4 3 4
Mid. Elec. Power	9	9	37/6	..	4 16 0
Newcastle Elec.	7	7	27/6	..	5 1 10
North Eastern Elec.:					
Ordinary	7	7	29/6	..	4 15 0
7% Pref.	7	7	33/3	..	4 4 2
Northampton	10	10	44/6	..	4 10 0
Notting Hill 6% Pref. (£10)	6	6	8½	..	—
Northmet Power:					
Ordinary	10	7	35/–	..	4 0 0
6% Pref.	6	6	29/6	..	4 1 4
Richmond Elec.	6	6	22/6	..	5 6 8
Scottish Power	8	8	38/3	..	4 3 4
Southern Areas	5	5	17/6	..	5 14 3
South London	7	7	23/6	..	5 19 2
West Devon	5	5	21/3	..	4 14 1
West Glos.	4½	4½	18/3	..	4 18 8
Yorkshire Elec.	8	8	38/9	..	4 2 8
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	3/3	..	—
Calcutta Elec.	8*	7*	37/–	..	3 15 9
Cawnpore Elec.	10	10	28/3	..	7 1 7
East African Power	7	7	25/9	..	5 8 9
Jerusalem Elec.	7	5	18/9	..	5 6 8
Kalgoorlie (10/–)	7½	7½	13/6	..	5 13 2
Madras Elec.	6*	4*	21/3	..	3 15 1
Montreal Power	1½	1½	28	+1½	5 17 2
Palestine Elec. "A"	Nil	Nil	18/3	..	—
Perak Hydro-elec.	2½	6	18/3	+9d.	6 11 6
Shawinigan Power	83cts.	90cts.	17½	+1½	—
Tokyo Elec. 6%	6	6	36½	..	16 8 8
Victoria Falls Power	15	15	80/–	..	3 15 0
Whitehall Inv. Pref.	7½	7½	13/9	..	10 18 2

Company	Dividend 1939–40	Dividend 1940–41	Middle Price Sept. 23	Rise or Fall	Yield £ s. d.
Public Boards					
Central Electricity:					
1950–70	5	5	110	..	4 11 1
1955–75	5	5	113	..	4 8 6
1951–73	4½	4½	107	..	4 4 1
1963–93	3½	3½	102	–½	3 8 8
1974–94	3½	3½	94	..	3 9 2
London Elec. Trans. Ltd.	2½	2½	95	+1	2 12 8
London & Home Counties 1955–75	4½	4½	106½	..	4 4 6
Lond. Pass. Trans.:					
A	4½	4½	113½	..	3 19 4
B	5	5	113½	+2	4 8 1
C	1½	3	44	+2	6 16 4
West Midlands J.E.A. 1948–68	5	5	108½	..	4 12 0
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	107½	..	5 11 9
Def.	1½	1½	24½	..	6 2 5
Anglo-Portuguese	8	8	15/–	..	10 13 4
Cable & Wireless:					
5½% Pref.	5½	5½	103	..	5 6 10
Ord.	4	4	63	+½	6 7 0
Canadian Marconi $1	Nil	4cts.	6/–	..	3 6 0
Globe Tel. & Tel.:					
Ord.	8½*	8½*	28/9	..	—
Pref.	6	6	27/6	..	4 7 3
Great Northern Tel. (£10)	20	20	14	..	—
Inter. Tel. & Tel.	Nil	Nil	3	..	—
Marconi-Marine	7½	7½	26/3	–⅛	5 14 1
Oriental Tel. Ord.	11½*	16	3⅝	..	4 8 6
Telephone Props.	6	6	11/3	..	10 13 4
Tele. Rentals (5/–)	10	10	9/–	+3d.	5 11 3
Traction and Transport					
Anglo. Arg. Trams:					
First Pref. (£5)	Nil	Nil	2/–	..	—
4% Inc.	Nil	Nil	7½	+3d.	—
Brit. Elec. Traction:					
Def. Ord.	45	45	885	..	5 1 8
Pref. Ord.	8	8	170	..	4 14 2
Bristol Trams	8*	8	41/3	..	3 17 8
Brazil Traction	$1	50c.	10½	–¼	—
Calcutta Trams	8	5½	23/9	..	4 12 7
Cape Elec. Trams	5	5	19/–	+1/–	5 5 3
Lancs Transport	10	10	42/6	..	4 14 1
Mexican Light:					
1st Bonds	5	5	55	+5	—
Rio 5% Bonds	5	5	85	..	5 17 8
Southern Rly.:					
5% Prefd.	5	5	61½	–3	8 2 8
5% Pref.	5	5	97½	..	5 2 7
T. Tilling	10	10	46/3	..	4 6 7
Tilling & B.A.	8*	7*	52/6	..	2 13 4
West Riding	10	10	39/–	..	5 2 7

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend 1939–40	Dividend 1940–41	Middle Price Sept. 23	Rise or Fall	Yield p.c.
Equipment and Manufacturing					£ s. d.
Aron Elec. Ord. ..	Nil	7½	22/–	..	6 16 4
Assoc. Elec.:					
Ord.	10	10	43/9	+⅛	4 16 3
Pref.	8	8	36/3	..	4 8 5
Automatic Tel.& El.	12½	12½	46/3	..	5 8 3
Babcock & Wilcox	11	11	45/–	−9d.	4 17 9
British Aluminium	12½	10	44/6	−1/9	4 10 0
British Insul. Ord...	20	20	90/–	..	4 9 0
British Thermostat (5/-)	18½	18½	13/9	+⅛	6 14 6
British Vac. Cleaner (5/-)	12½	10	11/3	+3/–	4 9 0
Brush Ord... ..	Nil	Nil	4/–	..	—
Callender's ..	15	15	70/–	..	4 5 9
Chloride Elec. Storage	15	15	65/–	..	4 12 4
Consolidated Signal	17	17	75/–	..	4 10 10
Crabtree (10/-) ..	17½	17½	28/9	+⅛	6 1 9
Crompton Parkinson Ord. (5/-) ..	30	20	19/6	..	5 2 8
E. K. Cole (5/-) ..	10	Nil	6/9	..	—
E.M.I. (10/-) ..	5	Nil	12/9	..	—
Electric Construction	10½	10	32/6	..	6 3 0
Enfield Cable Ord.	16½	12½	51/3	..	4 17 6
Elecl. Switchgear (10/-)	16	10	20/–	..	5 0 0
English Electric ..	10	10	35/–	..	5 14 2
Ensign Lamps (5/-)	25	25	16/3	..	7 13 10
Ericsson Tel. (5/-) ..	25*	22*	37/6	..	2 18 8
Ever Ready (5/-) ..	40	40	28/6	+3d.	7 0 4
Falk Stadelmann ..	7	7½	17/6	..	8 11 6
Ferranti Pref. ..	7	7	26/3	..	5 6 10
G.E.C.:					
Pref.	6½	6½	32/6	..	4 0 0
Ord.	20	17½	77/6	−½	4 10 2
Greenwood & Batley	15	13	22/6	..	11 11 2
Hall Telephone(10/-)	15	10	15/–	+⅛	6 13 4
Henley's (5/-) ..	20	20	21/3	..	4 14 1
4½% Pref. ..	4½	4½	21/3	..	4 4 8
Hopkinsons ..	15	15	45/9	..	6 11 0
India-Rubber Pref.	5½	5½	21/3	..	5 3 6
Intl. Combustion ..	32½	30	105/–	..	5 14 3
J. Lucas	15	15	61/3	..	4 18 0
Johnson & Phillips	15	15	52/6	+⅛	5 14 3
Lancashire Dynamo	20	20	61/3	+⅛	6 10 6
Laurence, Scott (5/-)	15	15	10/9	..	6 19 6
London Elec. Wire	7½	7½	22/6	..	6 13 4
Mather & Platt ..	13½	10	42/6	−⅛	4 14 1
Metropolitan Elec. Cable Pref. ..	5½	5½	21/3	..	5 3 6
Murex	20	20	88/9	..	4 10 1
Pye Deferred (5/-)..	25	25	13/9	..	9 1 10
Revo (10/-) ..	5	20	23/9	..	8 8 5
Reyrolle	12½	12½	55/–	..	4 10 3
Siemens Ord. ..	7½	7½	23/9	..	6 6 4
Strand Elec. (5/-) ..	4	2	3/–	..	3 6 8
S. Smith (4/-) ..	37½	50	7/–	..	7 2 10
Switchgear & Cowans (5/-)	10	15	8/9	..	8 11 6
Tel. Condenser (10/-)	Nil	5	11/3	..	4 9 0
T.C. & M.	10	10	41/3	..	4 17 0
Telephone Mfg. (5/-)	9	9	8/3	..	5 9 1
Tube Investments..	23¾	23¾	93/9	−⅛	5 1 4
Vactric (5/–) ..	4	Nil	3/–	..	—
Vickers (10/– ..	10	10	17/3	..	5 16 0
Ward & Goldstone (5/-)	20	20	16/6	..	5 19 9
Westinghouse Brake	17½	10	47/6	..	4 4 4
Walsall Conduits (4/-)	55	55	31/3	..	7 0 9
West, Allen (5/-) ..	7½	7½	3/9	..	10 0 0

* Dividends are paid free of Income Tax.

Stocks and Shares (*Concluded from page* 315)

colloquial parlance, bulging with money. The trio of India undertakings form the principal assets of the Oriental Telephone Co., but it may be decided to continue the business, using the purchase money in other directions.

Shares into Stock

The movement for conversion of shares with distinctive numbers into stock, has been slowly gathering momentum for some years past, a momentum now accelerated by war conditions. Shortage of staff, of paper, and of time, may be cited as the reasons for the change-over under current conditions.

In companies with a large share capital, the risk of mistakes creeping into distinctive numbers of the shares is obvious enough. Many companies have had experience of the trouble that can arise through distinctive share numbers being inaccurately copied, omitted or duplicated, innocently enough, and all the precautions taken to prevent errors are unable to save occasional mistakes. At first, there was a good deal of Stock Exchange official opposition to the proposals, but later on the opponents changed their views and, at the present time, the Stock Exchange offers no objection to what is becoming a general practice. Babcock & Wilcox is one of the latest companies to make the change.

Canadian Marconi

Speculation is taking a hand once more in the shares of the Canadian Marconi Company. The price revolves around 6s. 0d. Every now and then a fair-sized buying order comes into the market on this basis. After the last war, Canadian Marconi shares, it may be recalled rose to something like £4 per share. The chances of this happening again are extremely slender. The cynic would say that such a chance has been completely killed by the fact of the Canadian Marconi paying a dividend, which at the present time is 4 per cent. Payment of a dividend has, from the Stock Exchange point of view, the effect of establishing some kind of standard against which a price can be measured. So long as a company refrains from making a return to its shareholders, so long will imagination enlarge the scope that exists for generous treatment of the shareholders.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specifications (1*s. each*) *can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.*

1939

28919. "Carrier-frequency relay communication systems." Marconi's Wireless Telegraph Co., Ltd. October 29th, 1938. (539105.)

31465. "Electro - magnetically operated switches, particularly for controlling motors." J. E. Pollak (Vapor Car Heating Co., Inc.). December 4th, 1939. (539146.)

32753. "Arc-extinguishing arrangements, more particularly for electric switches and circuit-breakers." General Electric Co., Ltd., and W. F. Baker. December 22nd, 1939. (539025.)

32905. "Electric cables." Liverpool Electric Cable Co., Ltd., and J. T. Frost. December 27th, 1939. (539109.)

1940

1535. "X-ray dental photographic apparatus." K. Riesenfeld. January 25th, 1940. (539110.)

1645. "Pipes, containers, casings, or the like for gases of high temperature." Akt.-Ges. Brown, Boveri & Cie. January 30th, 1939. (539069.)

3431. "Keyboard apparatus." Creed & Co., Ltd., A. E. Thompson and R. D. Salmon. February 23rd, 1940. (539032.)

3435. "Remote-control arrangements such as for radio transmitters." Standard Telephones & Cables, Ltd., and E. A. H. Bowsher. February 23rd, 1940. (539033.)

3464. "Electric plug couplings and like connectors or jack plugs." Marconi's Wireless Telegraph Co., Ltd., C. S. Cockerell, J. D. Brailsford and M. H. Cufflin. February 23rd, 1940. (539034.)

3516. "Regulation of electric generators for charging storage batteries." C. A. V., Ltd., W. A. Bevis and A. V. Waters. February 24th, 1940. (539039.)

3561. "Sockets for thermionic valves and the like." Cinch Manufacturing Corporation. December 12th, 1939. (539040.)

3670. "Electric wiring systems and devices for use therein." Automatic Telephone & Electric Co., Ltd., A. E. Graves, and W. A. Harrison. February 27th, 1940. (539118.)

3712. "Electric circuits for coupling unequal impedances." Marconi's Wireless Telegraph Co., Ltd. February 28th, 1939. (539194.)

3759. "Systems for transmitting frequency-modulated carrier-wave signals." W. S. Percival. February 29th, 1940. (539198.)

3793. "Combined key and flashlight." C. Cramer. January 24th, 1940. (539202.)

3794. "Drives of the two-electric-motor type for printing presses and other machines." Igranic Electric Co., Ltd. March 31st, 1939. (539203.)

4038. "Electric dry cells or batteries." R. E. Carr. March 4th, 1940. (539042.)

4355. "Method of and apparatus for interrupting electric circuits." Westinghouse Electric International Co. March 11th, 1939. (539162.)

4401. "Electrical switchgear." G. W. Davidson, and Metropolitan-Vickers Electrical Co., Ltd. March 8th, 1940. (539075.)

4747. "Electrical contacts." Johnson, Matthey & Co., Ltd. March 16th, 1939. (Cognate application 4748/40.) (539120.)

5006. "Excitation-control system for synchronous machines." British Thomson-Houston Co., Ltd. March 18th, 1939. (539121.)

5450. "Magnetic coils for deflecting cathode rays and similar purposes." Jefferson Electric Co. June 2nd, 1939. (539122.)

6505. "Shunt alternating-current commutator motors." B. Schwarz. April 10th, 1940. (539209.)

7660. "Piezo - electric thickness - mode crystals." Marconi's Wireless Telegraph Co., Ltd. April 29th, 1939. (539047.)

7735. "Means for accurately spacing articles on conveyors." Igranic Electric Co., Ltd., H. H. Rapley and G. H. Rawlins. April 30th, 1940. (Addition to 508227.) (539126.)

7996. "Electric motor-control systems." English Electric Co., Ltd., H. S. Carnegie and R. L. English. May 3rd, 1940. (539127.)

8293. "Electric conductors of the sheathed-wire type." British Thomson-Houston Co., Ltd., W. J. Sims and B. P. Brunt. May 8th, 1940. (539050.)

8840. "Negative feed back amplifier circuit." Standard Telephones & Cables, Ltd. August 5th, 1939. (539170.)

9251. "Forced circulation water - tube boilers." La Mont Steam Generator, Ltd., and V. B. Harley-Mason. May 25th, 1940. (Cognate application 3531/41.) (539081.)

9681. "Sprocket pads of kinematograph machines." British Thomson-Houston Co., Ltd., and B. R. Davies. June 3rd, 1940. (539058.)

9971. "Stabilised vacuum tube oscillator." Standard Telephones & Cables, Ltd. June 24th, 1939. (Addition to 510379.) (539082.)

10077. "Balanced suspension devices, particularly for X-ray apparatus." British Thomson-Houston Co., Ltd. (Compagnie Française pour l'Exploitation des Procédés Thomson Houston). June 10th, 1940. (Convention date not granted.) (539084.)

10367. "Electric control systems particularly for illumination control." Igranic Electric Co., Ltd. July 15th, 1939. (539088.)

10496. "Apparatus embodying radio receiving apparatus." D. J. Crowley. June 17th, 1940. (539213.)

10667. "Cores for electrical apparatus, and method of making the same." British Thomson-Houston Co., Ltd. June 21st, 1939. (539093.)

10724. "Synchronising apparatus, particularly for picture telegraphy and the like." Marconi's Wireless Telegraph Co., Ltd. June 21st, 1939. (539094.)

10753. "Automatic tuning arrangements for electric signalling systems." British Thomson-Houston Company, Ltd. June 22nd, 1939. (539130.)

10897. "Spark-jump distributors for internal-combustion engines." British Thomson-Houston Co., Ltd., and T. F. Robinson. June 26th, 1940. (539215).

11471. "Method of and apparatus for increasing the operating speed of movable elements in sound-film apparatus." Klangfilm Ges. July 10th, 1939. (539177.)

11850. "Clothes wringers." British Thomson-Houston Company Ltd. July 18th, 1939. (539098.)

12087. "Washing machines." British Thomson-Houston Co., Ltd. July 27th, 1939. (539100.)

12789. "Current supply and control arrangements for arc lamps." Standard Telephones & Cables, Ltd. August 11th, 1939. (539133.)

13236. "Manufacture of electric cables." Standard Oil Development Co. October 21st, 1939. (539134.)

13347. "Non-dazzle headlamps." British Thomson-Houston Co., Ltd. August 25th, 1939. (539135.)

13554. "Electric liquid-heaters." British Thomson-Houston Co., Ltd. August 28th, 1939. (539178.)

15054. "Electric hotplates." British Thomson-Houston Co., Ltd. October 10th, 1939. (539141.)

15344. "Nickel anodes." Mond Nickel Co., Ltd. October 16th, 1939. (539180.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Bridgend.—October 22nd. Electricity Department. Outdoor type switchgear and transformers. (See this issue.)

Dewsbury.—October 6th. Corporation. Lamps and cables. (September 19th.)

Dundee.—October 1st. Corporation Emergency Committee. Installation of 15-A plug points at 26 A.R.P. wardens' posts.—City quantity surveyor, 21, City Square.

Manchester.—September 26th. Supplies of single, three-core and multicore cable. Mr. H. C. Lamb, engineer and manager, Electricity Department, Town Hall, Manchester, 2.

Morley (Yorks).—September 30th. Electricity Department. Change-over of two installations from single- to three-phase. Borough electrical engineer, Electricity Office, Morley.

Plymouth.—October 11th. Electricity Supply Department. Overhead travelling crane. (See this issue.)

South Africa.—SALISBURY (S. RHODESIA).—October 13th. City Council. Stoker-fired water-tube boilers and other power station plant. (August 29th).

October 27th. Switchgear, transformers and reactors, together with auxiliary apparatus. (August 29th).

DURBAN.—October 3rd. City Council. Overhead line material for trolley-bus operation (contract S.1972). 3/0 trolley wire (contract S.1973). Overhead line material for tramway operation (contract S.1975).

October 17th. Telephone cable (contract P.261). 72 transformers (contract E.2032).

POST OFFICE.—December 4th. Equipment for radio - telephone link between Maseru and Mokhotlong.

October 27th. City Council. 90,000 lb. overhead electric travelling crane. (See this issue.)

Orders Placed

Clydebank.—Public Health Committee. Accepted. Installation of electrode steam boilers in Blawarthill Hospital (£3,964).—Bastian & Allen. Ltd.

Glasgow. — Police Committee. Accepted Emergency generating plant required at Police Headquarters in connection with the police wireless scheme (£196).—R. A. Lister & Co.

Committee on Libraries. Accepted. One goods and passenger lift and three service lifts, to be installed at Mitchell Library extension (£1,986).—Glasgow Engineers, Ltd.

Transport Committee. Accepted. Renewal of condenser tubes at power station. G. & J. Weir, Ltd. Fishplates for permanent way.—Dorman, Long & Co., Ltd. Electrolytic copper bars for substations.—Charles Henderson & Co., Ltd.

London. — HAMMERSMITH. — Borough Council. Accepted. Supply and erection of four e.h.v. switches (£1,146).—Ferguson, Pailin, Ltd. Additional e.h.v. feeder switch (£320).—Switchgear & Cowans, Ltd.

Portland.—Electricity Committee. Accepted. 350-kVA power transformer (£312).—Ferranti, Ltd.

Swanscombe.—Emergency Committee. Accepted. Heating works at cleansing station (£26).—Kent Electric Power Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Provision of kitchens at housing estates, etc.; A. B. Gardner, city architect.

Abergele.—Water scheme, Rhydyfoel (£9,500), for U.D.C.; surveyor, Pentre Mawr, Abergele.

Ashby-de-la-Zouch. — Conversion of mission room into British Restaurant (£643), for U.D.C.; G. E. Marlow, surveyor, Town Hall, Ashby-de-la-Zouch.

Bacup.—Two British Restaurants; borough engineer, Municipal offices, Stubbylee Hall.

Bedford.—Shelters (£12,000); borough engineer.

Bootle.—Adapting buildings on seven sites for British Restaurants; W. A. Harrison, borough engineer, Town Hall, Bootle, Liverpool, 20.

Blaydon-on-Tyne.—British Restaurant at Chopwell; U.D.C. surveyor.

Boston.—Completion of new ward at hospital; Councillor A. G. Rysdale, chairman, Committee of Management, Boston General Hospital, South End, Boston.

Bredbury.—Nursery school; E. M. Parkes, acting county architect, The Castle, Chester.

Brierley Hill.—Canteens in public shelters, for U.D.C.; surveyor, Council offices, Brettell Lane.

Bromsgrove.—Additions to Park Gate Inn; Dare's Brewery Co., Belgrove Road, Birmingham, 12.

British Restaurant, Stourbridge Road, for U.D.C.; E. Giles, builder, Stourbridge Road, Bromsgrove.

Chanctonbury (Sussex).—Works in connection with water supply scheme for R.D.C.; Howard Humphreys and Sons, consulting engineers.

Chard.—Fire station extensions, for R.D.C.; clerk, Snowdon House.

Coseley.—Canteens for public shelters; surveyor, Council House, Coseley, Sedgley.

Coventry.—Structural alterations to British Restaurant (£5,827), and permanent feeding centre, Old Church Road (£4,012); D. E. E. Gibson, city architect, 1a, Warwick Row.

Darlington.—Decontamination centre for T. Summerson & Co.; W. S. Hutton, Ltd., builders, Post House Wynd, Darlington.

A.R.P. quarters for H. Williams, Ltd.; Bussey & Armstrong, builders, Brinkburn Street, Darlington.

Brick surface shelters at Heighington; W. Pallister, surveyor, R.D.C. offices, 53, Coniscliffe Road, Darlington.

Darton.—Canteen; W. H. Copley, secretary, Fountains & Burnley, Ltd.

Fleet.—Reconstruction of 3 and 4, Park Villas, Aldershot Road, Crookham, and workshop; County Commercial Cars, Ltd., Upper Street, Fleet.

Glasgow.—Four additional cooking centres each capable of providing 5,000 meals per day; Town Clerk.

Hemsworth.—Alterations to isolation block at Hospital; S. Price, engineer and surveyor, Market Chambers, Hemsworth, Yorks.

Herefordshire.—Alterations to County Hospital; clerk of the County Council, Shirehall, Hereford.

Holyhead.—Conversion of Railway Institute into British Restaurant, for U.D.C.; R. E. Price, surveyor, Town Hall, Holyhead, Anglesey.

Huyton.—Police station; S. Wilkinson, county architect, County offices, Preston.

Jarrow-on-Tyne.—Canteen at Jarrow Tube Works; Bewley & Scott, Ltd., builders, Dunston-on-Tyne.

Liversedge.—Extensions to factory; Cook, Sons & Co., Ltd., Carr Mills, Dewsbury.

London.—FULHAM.—First-aid post (£1,550); borough engineer.

Manchester.—British Restaurant, Flixton Road, Urmston; E. L. Leeming, surveyor, Council offices, Crofts Bank Road, Urmston, Manchester.

British Restaurant at Hooley Hill, Andenshaw; H. M. Doxey, surveyor, Council offices, Ryecroft Hall, Audenshaw, near Manchester.

Canteen and garage, Newton Heath; W Johnson & Son, architects, 27, Oldham Road, Miles Platting, Manchester.

Northallerton.—British Restaurants at Romanby and Borough Bridge Road; R.D.C. surveyor.

Northenden.—Additions to Woodside Café, Wythenshawe Road; H. Hankinson, architect, 3, The Downs, Altrincham.

Northern Ireland.—LARNE.—Combined first aid post and cleansing station; Town Surveyor's office, Victoria Street, Larne.

Nottinghamshire.—Erection of store, and various maintenance works, Southwell Institution, for C.C.; county architect, Shire Hall, Nottingham.

Ormskirk.—Establishment of emergency feeding centres, for West Lancashire R.D.C.; surveyor, Council offices, 52, Derby Street, Ormskirk.

Paignton.—Three feeding centres; U.D.C. surveyor.

Petersfield (Hants).—Communal feeding centre, for U.D.C.; Surveyor's Department, Town Hall.

Redditch.—Canteens for public shelters, for U.D.C.; L. O. Wilkes, surveyor, Council House.

Retford.—Canteen; Clark's Dyeworks, Ltd.

Rochdale.—Adaptation of premises for traffic department and police garage; S. H. Morgan, borough surveyor, Town Hall.

Canteens; New Ladyhouse Mill Co., Ltd., Bilston Road, Milnrow; and Ellenroad Ring Mill Co., Ltd., Ellen Road, Newhey.

Salford.—Completion of unfinished houses at Tellson Crescent, Bank Lane, Pendleton, and Wensley Road, Kersal; W. A. Walker, borough surveyor, Town Hall, Salford, 3.

Stockport.—Day nurseries at Midland Road, Reddish and Bloom Street, Edgeley; W. F. Gardner, borough surveyor, Town Hall, St. Peter's Square, Stockport.

Stourbridge.—Adaptation of premises for use as borough restaurant; G. N. Maynard, borough engineer, The Council House.

Sunderland.—Six British Restaurants; O. T. Mark, Education Offices, Tatham Street, Sunderland.

Thirsk (Yorks).—Air-raid shelters in rural area; F. S. Gowland, R.D.C. offices, Sowerby, Thirsk.

Tyneside.—Works canteens; J. W. Taylor & Son, Norwich Union Buildings, Westgate Road, Newcastle-on-Tyne.

Washington.—Extensions to communal feeding centre; J. Harrison, surveyor, U.D.C. officer, Washington, C. Durham.

Winsford.—British Restaurant, for U.D.C.; P. Heaton, surveyor, Council offices, Winsford, Cheshire.

Yorkshire.—School canteens at Lady Lumley's and Richmond Grammar Schools (£1,350); North Riding county architect, County Hall, Northallerton.

Institution of Mechanical Engineers

The opening meeting of the Institution of Mechanical Engineers for the 1941-42 session will be held on October 24th, when Mr. W. A. Stanier will deliver his presidential address.